RAILROAD GAZETTE

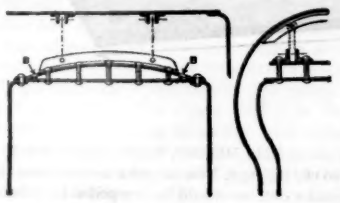
FRIDAY, DECEMBER 17.

Shop Notes.

IN CANADA.

The Great Western Division of the Grand Trunk is in some respects worked as a separate organization from the Grand Trunk, and has its own shops and adheres to its own standards. The locomotive shops are situated at Hamilton and he car shops at London.

The shops at both places are well built and lofty, the walls being of stone and white brick respectively. The shops at Hamilton are well equipped with tools, cranes, etc. In one erecting shop two overhead travelling cranes are used, one



Darby's Locomotive Crown-Sheet.

for each end of the engine being lifted. The crabs, etc., were made by Messrs. Wren & Hopkinson, of Manchester, England, while the girders were made in the railroad shops.

The Great Western bought some 200 new engines at the time it changed gauge, and while these engines have hitherto cost little to keep in repair, they are now all simultaneously in want of heavy repairs, new boilers and fire-boxes, etc.

The Darby crown sheet is used on many of these rebuilt engines, and is found to give excellent results. An arched steel plate about ⅝ in. thick with about 7 in. rise is riveted to the crown-sheet by the same rivets that secure this crown, sheet to the tube-plate and door-sheet. Stays are then screwed from the crown-sheet into the arched sheet. The back of the latter is strengthened by angle irons, to which the sling stays are secured. It might be anticipated that mud would lodge in the spaces but it is not found to be the case, while the space between the crown-sheet and the under surface of the usual style of crown bar always filled up with mud and caused a great deal of trouble. Some holes are made in the Darby arched sheet at *B*, *B*, so as to allow the steam to escape freely. It is said that engines with this form of crown carry their water very steadily, and that it does not rise and fall in the glass as in engines fitted with either direct stays or ordinary crown bars. It will be observed that the arched sheet forms virtually a bowstring girder, the arched plate being the top member in compression and the crown-sheet the bottom member in tension. The stays of course transfer the load to the compression chord, and in this form of girder practically no diagonal bracing is required. The fire-box is as free to rise as with ordinary roof bars. The accompanying sketch (which is not drawn to scale) shows this contrivance, which, though not new, is little known.

This division has for many years made all its new engines at the Hamilton shops. The regular standard boiler has direct stays, and the top of the box is rounded with curves of large radius, so that the direct stays enter both the casing-plate and the crown-sheet nearly at right angles.

The locomotive driving axles are made slightly larger in the wheel-seat than the journal, and slightly larger in the eccentric and collar-seat than in the wheel-seat, the different diameters being united with a fillet. The centre of the axle is left rough from the hammer, and is somewhat smaller than the journal. This method of proportioning an axle is slightly more expensive than the usual plan of shouldering down the axle where it enters the wheel, but makes a stronger axle, as it avoids the wheel shoulder at the back of the wheel-seat.

Some four-wheels coupled switching engines are nearly completed. The front end of the engine is carried on a four-wheeled truck, and the hind end on a Jewell two-wheeled or pony truck. This truck has been much used by the Rhode Island Locomotive Works. The centre bearing is formed of a plate with radial corrugations. Two tapered corrugated rollers are interposed between this plate and a corrugated plate placed on the truck bolster. The latter plate is V-shaped, the sides sloping toward the centre. The truck works with little friction, and is kept central in a manner simular to the Bissell truck, but the interposition of rollers between the surfaces lessens the friction, while the corrugations oblige the rollers to revolve when any movement takes place, and retains them always in their proper position. Were plain rollers used, they might get flat by wear and pressure, and would then work with considerable friction.

These engines carry their water (1,800 American gallons) partly in the saddle tank over the boiler and partly in a tank under the coal space and over the hind truck. They would appear to be a useful engine for working local trains, especially on such a local line as the Great Western. The worst grade, Copetown, rises directly west from Hamilton at from 45 ft. to 54 ft. per mile for 11 miles. With the exception of another grade near Niagara Falls of 33 ft. to the mile, the rest of the line is practically level, and therefore only four-coupled engines are used.

The Grand Trunk proper and the numerous lines now part f the system have, however, very heavy grades, and therefore Mr. Wallis, the Superintendent of Motive Power, has adopted a Mogul with 18 by 24 cylinders and 62-in. wheels for a standard freight engine, and a plain six-coupled engine with 56-in. wheels for switching. Fire-brick arches and a large deflector in the fire-door are used on the Grank Trunk, and the fire-door is generally kept open while running, but neither brick arch nor deflector is used on the Great Western division.

Mr. C. R. Domville, the Superintendent of Machinery, finds, contrary to the general opinion, that the brick arch does not materially lessen smoke, or diminish the number of leaky flues. With the brick arch, the dust collects round the leakage and adheres to the flue sheet, forming a deposit which would in time choke up the flue orifice. It must then be scraped off, and this cannot easily be done with the brick arch in the way.

A new spark arrester will shortly be tried on this line. The deflector plate, and base of the smoke-box and inside of the smoke-box door will be formed of cast-iron plates with chilled ridges with sharp edges. It is anticipated that the sparks will strike the saw-like teeth or ridges and will be pulverized until they are fine enough to escape through the netting.

The usefulness of the car works at London are much crippled by three of the main shops having been burned down nearly two years ago. Though the walls of two shops are still standing, no effort has been made to roof them and replace the machinery and shafting, and the work is carried on partly in temporary shops and partly in the open air, while a little new machinery has been placed in the smith's shop.

The car wheels are made in the locomotive shops at Hamilton, a careful record being kept of the mixtures used for each day's work, with specimens of the drills, generally about ⅝ in. deep. As the date of carting is placed on each wheel, the exact mixture used in any wheel which fails can be readily ascertained from the record. Wrought-iron spoke wheels 42 in. diameter with steel tires and Mansel fastening are used under parlor and dining cars.

Mr. McIlwaine, the Master Car-Builder, has been experimenting with a view to obtain a better light in cars than that given by the ordinary style of lamp. It was not considered desirable to go to the expense of electric light or gas, and the Rochester style of lamp, which answers well for household purposes, is unsuitable for the draughts in passenger cars. He, however, has now obtained some lamps from Adams, Westlake & Co., of Chicago, which give 63 candle power on a consumption of 3 pints of oil.

The Baker heater is generally used on all first-class cars throughout the Grand Trunk system, but the addition of salt has been found so troublesome that the Baker system is now used with fresh water only. The fires are kept alight from the time the cars leave the shop until they return to it, and wherever the cars stand for some hours arrangements are made whereby a watchman or some other appointed person visits the car at intervals and keeps the fire alight.

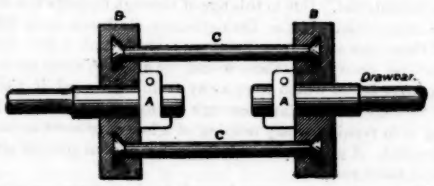
IN MICHIGAN.

The Michigan Car Works at Detroit are now very busy, and are working day and night in all the shops except the erecting shop. When the day gang leave the foundry after castings, a night gang come on, fettle the castings and leave everything ready for the day gang to start molding in the morning.

An order for 1,000 box cars of 60,000 lbs. capacity has just been completed for the Pennsylvania Company. These cars measure 34 ft. inside, but the inner sheeting is carried up higher than usual, so that it can be loaded high enough really to carry its full capacity. The car has been strengthened all through, the axles being steel with 7-in by 4-in. journals, and the wheels weighing 580 lbs. each. The truck is of the Cloud pattern, without swing motion, with untrussed oak bolster, and 12-in. channel iron truck transomes. The cars have the Wagner door, which is flush with the side when closed. End platforms are used, the brake-wheel at one end of the car being above the roof on a vertical shaft and at the other end on a short horizontal shaft, the wheel being worked from the end platform.

An order for 60,000-lb. gondolas for the Pennsylvania Company has also been lately completed.

An order for 2,000 box cars of 50,000 lbs. capacity is being executed for the Baltimore & Ohio. These cars have continuous draw-bars made in two parts, and connected in the



centre of the car by means of a stirrup, as shown in the accompanying sketch, which is not to scale. By knocking out the latter *A* the draw-bar can be readily removed, and in buffing no compressive strain can come on the draw-bars. The washers *B* are cast on the wrought iron bars *C*, which have countersunk heads. Where the draw-bars are made in one piece or rigidly connected, it was often found extremely difficult to remove them after a collision, the long bar being doubled up in such a way that is was very difficult to move it. When the draw-bars are made in two parts and easily uncoupled, this difficulty disappears.

The Minneapolis & Pacific have 50 flat and 75 box cars building here. The axle-boxes have a wooden cover sliding vertically into dove-tail grooves in the front of the box. The trucks are swing motion.

A large number of refrigerator cars of different patterns are being built here, including 12 Swift refrigerator express cars for the Michigan Central. These cars are fitted with Miller platform, etc., and are intended to run on passenger trains. The Hutchins patent roof is used.

Some Hammond refrigerator cars for dressed beef have Woolley's patent spring case. The bolster springs, being entirely inclosed, are protected from ice, salt, etc., and a stop in the case is intended to prevent the springs being driven together solid in going over a rough spot in the road. The stop and casing, however, appear very light for such a purpose. These cars have a Thielsen swing-beam truck.

Two hundred fruit cars are being built for the Union Pacific. These cars are not fitted with any refrigerating apparatus, and are merely made tighter than an ordinary car and fitted with ventilating apparatus, so that the air can be shut out or allowed to circulate, as may be thought desirable. The side doors shut on a strip of rubber, and the sides are double. Upper and lower ventilating doors are provided in the ends. These cars are fitted with the Westinghouse brake, the Winslow roof, and swing-beam trucks, with wooden truck bolsters.

All the various cars now under construction have the common draw-head, though cars with the Aikman, Ames, Blocker, Dowling, Janney and other couplers have been constructed recently.

The shops are well arranged for doing a large amount of work, and are fitted with special tools for drilling all the holes in arch-bars simultaneouly; bending arch-bars to form under a steam hammer; upsetting the ends of draw-bars or truss rods so that strength is not lost where cut away for screw thread, or the latter hole, etc. A tramway of 3-ft. gauge runs through the principal shops.

The wheel foundry is conveniently arranged. The ladles are lifted, lowered and traversed by means of a species of overhead-traveler in each bay, the power being derived from a shaft running across the shop at right angle to the various bays. Horizontal wire ropes running the length of each bay at the level of a man's head put the clutches that work the traveler in and out of gear. Hence, in handling the ladle, these horizontal ropes have only to be pulled to make the crane rise or lower, or move forward or backward, as desired. The ladles are brought from the cupola on small four-wheeled cars running on a line laid along one end of the foundry at right angle to the length of the bays. The car takes the ladles to the end of the bay, and the ladle is then lifted from the car by the crane working in each bay and described above.

The shops are lit with the electric light and are very conveniently situated on a triangular plot of ground with a road on one side, the Michigan Central runs along another side, and the Grand Trunk bounds the third side. The railroad facilities are thus excellent.

Contributions.

The Driven-Well Patent.

Eas'ern Railroad Association,
No. 614 F Street, N. W.,
WASHINGTON, D. C., Dec. 11, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 10, on page 849 I notice a statement under head "The Driven-Well Patent," which appears to be erroneous, and I think should be corrected.

The facts are that the decision of Justice Colt referred to is in the form of a rescript, overruling a demurrer filed in the case which questioned the legality of the reissue of the patent. Said rescript is as follows:

CIRCUIT COURT OF THE UNITED STATES, DISTRICT OF MASSACHUSETTS.

NELSON W. GREEN, v. THE FITCHBURG RAILROAD CO. — No. 2,622—Law.

RESCRIPT.

(Filed Nov. 19, 1886.)

Although the decision in Andrews *v.* Hovey (16 Fed. Rep., 387) holds the Green reissue to be void by a divided court, still, in view of the various decisions of the Circuit Court sustaining the reissue, and in view of the fact that the Supreme Court in Wahl *v.* Hine affirmed the decision of Judge Gresham, the judges being equally divided in opinion, I think this Court should follow the judgment of the Supreme Court until the question can be re-examined by that tribunal, where, I understand, another case is now pending.

You will observe that what you have quoted as the language used by Justice Colt is erroneous, and omits entirely the latter part of the rescript referring to the re-examination of the question by the Supreme Court.

I think you should publish the rescript in full, so that those interested in the matter may know the exact facts of the case.

The case of Green *v.* Fitchburg Railroad Co. will proceed to trial on the merits. A. MCCALLUM, Secretary.

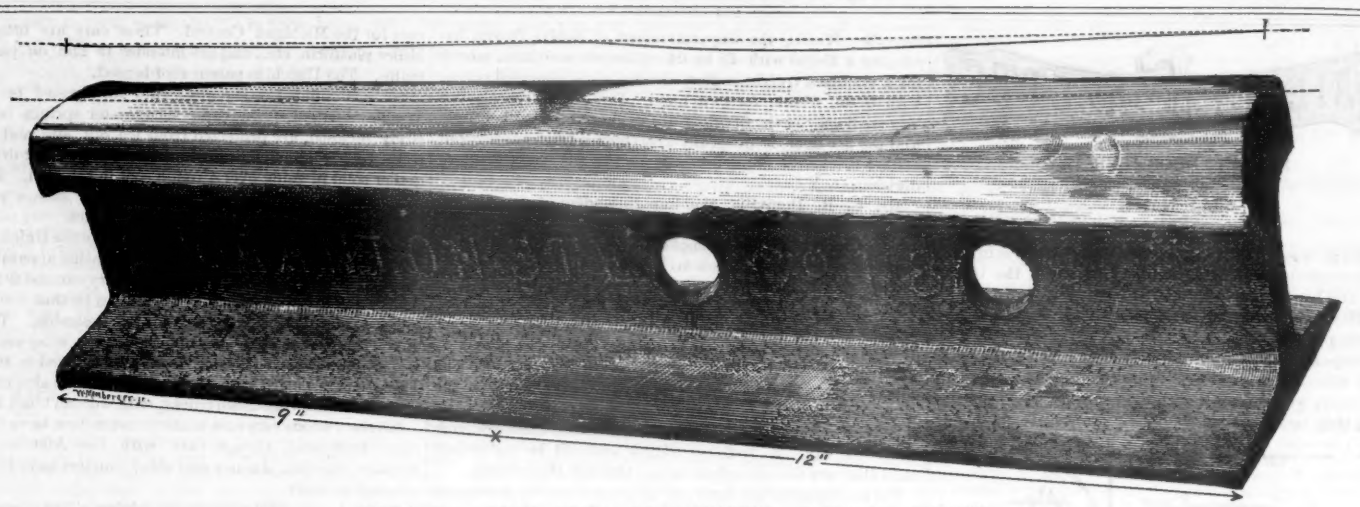
Hardaway's Pocket Book.

AMERICUS, Ga., Dec. 9.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* for Nov. 26 a *Pocket Book of Tables and Formulæ for Railroad Engineers*, by B. H. Hardaway, A. B., B. E., E. & F. N. Spon, New York, is noticed.

I beg leave to correct an error of the reviewer as to the intended scope of the volume. He supposes that it was intended simply as an *aide memoire* to the transitman of a locating party. The design, however, was to supply formulæ and tables for a principal assistant or any engineer who was charged with making a reconnoisance, a preliminary survey, flying levels by angular measurements, or by aneroid; also to give the transitman on the location of axis of the road, or engaged in putting in frogs, switches and turnouts, the necessary formulæ. This having been the scope of the book, "the principle of selection" was to supply the necessary formulæ, and not to limit the work to the needs of a locating transitman.



WORN RAIL FROM TRACK OF MANHATTAN (ELEVATED) RAILWAY.

Placed in track, May 7, 1885; taken out, July 8, 1886.

Had the latter limited purpose been carried out, there would have been space for adding many "thumb rules" for transitmen, though these would have been more in place in an *aide memoire* a quarter of a century ago. However necessary the geometrical demonstrations of Searles and Henck may be, the hand-book must leave the engineer to these and to his Euclid.

Of course there will always be a difference of opinion as to the formulæ which can be omitted from a hand-book. It was supposed that the engineer was familiar with his work, and even understood the use of transition curves in some measure.

The idea carried out in the treatment of transition curves was to first find out exactly what we wished to accomplish, and the most satisfactory and convenient method of accomplishing it that we can, and then to simplify it, as much as possible, and systemize it to such an extent that we have a transition already made out for any and every degree of curve.

On a road using such a system any assistant can reproduce any part of the line, the transition curves being determined in all their parts by the degree of curve used. After accomplishing the object for which the system is designed, any further elasticity was regarded not only as useless, but decidedly disadvantageous, as it adds useless complication in the field besides the theoretic difficulty in the way of many engineers. B. H. HARDAWAY.

The Question of Rail Joints.

Office of the Fisher Rail Joint Works.
TRENTON, N. J., Dec. 11, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the letter of Mr. Wm. H. Brown, Chief Engineer of the Pennsylvania Railroad Co., which appears in your last issue, I must ask to trespass upon your space to correct a possible erroneous impression which I am convinced Mr. Brown would not designedly convey, that he had either tried the Fisher joint "two or three times before," or that he had "paid dearly" for anything connected with it. As a matter of fact, the first trial ever made by the Pennsylvania Railroad of the Fisher bridge joint is that now going on, of about four-fifths of a mile in the main line at Parkesburg, but a year ago last August in a place which Mr. Brown assured me at the time was about the most difficult to maintain in that division. It is wet, on a slightly down grade, and ends as a part of a 3 degree curve. The track was raised 3 in., 304 new ties put in, and the whole ballasted in the usual manner. It is reported to have cost less to put down, and very considerably less cost for maintenance since, than any other in a similar situation. Mr. Brown surely cannot mean to assert or imply that it has made so far anything but a most excellent record.

Many years ago [from 1868 to 1875] the old Fisher & Norris joint was in use on the present New York Division of the Pennsylvania Railroad, but it was entirely unlike the present form of the Fisher bridge joint both in principle and construction, it being a *suspended* joint, only 10 in. long, held together with three U-bolts between the ties. These, however, were all removed when Mr. Brown became Chief Engineer of the Pennsylvania Railroad, in 1875, I believe. It is true those joints may be said, in a sense, to be the originals from which the present Fisher joint has been developed, but they differ from it so radically that there can be no propriety in confounding the two, even had they ever been in use on the Pennsylvania Railroad; which, as I have said, is not the case.

In respect to the breakage of the "No. 4" joint, I must submit that neither the road nor the designer of that joint was specifically mentioned by me, for a number of other roads have used it, or one similar to it, with a like result. I do not quite understand how it can be that the No. 4 angle-bar "is not breaking where it has a fair chance." Where else could these 136 broken No. 4 angle-bars have a fairer chance than on the Pennsylvania Railroad Division? Of course it is only a matter of conjecture as to how much this No. 4 angle-bar may be strengthened when a 5-in. rail is applied to it. The statement as to breakage of which he complains was in reference solely to the actual results so far, on that and on other roads, to which I will only add that *time* is an important element in the breakage and wear of joints, and that it has not yet had a chance to develop its full effects. I confidently look for a failure of the new joint whatever the size of the rail which may be hereafter used, as of all previous ones; that is true; and I regard the course of events so far only the beginning of the end. But I should regret to give a discussion of the question of its merits, or indeed a discussion of any other, anything of a personal tone.

That the radical and incurable defects of the angle-bar system, of whatever design or proportions, are now being generally admitted, and the "Fisher" direct supporting plan recognized as the only one devised on correct mechanical principles, is emphasized by an incident which came to my knowledge almost at the same time as I read Mr. Brown's letter, viz., the recent action of the Union Bridge Co., who have adopted the "Fisher bridge joint" for the great Poughkeepsie bridge and its approaches—a structure which will probably carry a greater coal tonnage than any other in the country. And this, I might likewise add, coincides with the actions and conclusions of numerous other engineers and railroad men, if it seemed the proper occasion here to enter into such details. CLARK FISHER, C. E.

Is the Present Mileage Rate Excessive?

TO THE EDITOR OF THE RAILROAD GAZETTE:

At our last convention, which met in Buffalo, June 22, I read a paper on the "Life and Profits of a Freight Car," in which I presented certain tables which induced me to conclude that the present rate of ¾ cent per mile was not excessive. This paper was reprinted by a majority of the railroad journals, and met with various criticisms, but I wish in this paper more especially to refer to the criticisms made by the *Railroad Gazette* and the *American Railroad Journal*. The *Journal* took the position that the repairs in the table did not represent what is known as renewals, and the *Railroad Gazette* contended that the repairs included both current repairs and renewals.

In this position the *Railroad Gazette* was correct. The repairs included all repairs from the time the car left the shop a new car, until it is returned to be torn down. I believe our cars are more expensive to maintain than more modern cars, as a great majority of them were built years ago and are not so well equipped for modern traffic. Our cars, with a capacity for only 25,000 to 35,000 lbs., are required to haul 40,000 lbs. The wear and tear is consequently greater. But I am certain that repairs as shown as correct for cars now in general service which were built previous to 1880. In my opinion a car should not be required to do more than pay for itself in mileage after furnishing all necessary repairs. Of course, the value of old materials in car when worn out must be taken into consideration. If more than this is expected or allowed it will induce an excess of private car companies, and if on the contrary the rate is too low it will work an injustice to those whose interchange of cars is unequal. If the interchange of cars between all roads was equal the rate of mileage would be immaterial. But in this age of through freights this would be impossible. If the Pennsylvania Railroad have 10,000 of their cars away from home and only have 5,000 foreign cars on their rails, there would be a loss to them for every car over 5,000 which were away from their road if the rate of mileage was not large enough to pay for the car after keeping it in repairs, to say nothing of a loss of interest on money invested. A good average mileage for cars in general service is 35 miles per day.

The question of repairs depends to some extent on circumstances. Cars earning 35 miles per day make it in 36 per cent. of the time, the remaining 64 per cent. of the time they are at stations.

This shows that car service can be greatly improved by the decrease of unnecessary detentions at stations, and also suggests that with this improvement earnings from car mileage would be greatly increased.

The question is frequently asked: If cars in general service make only 35 miles per day, and cost so much to keep in repairs, how can private car companies afford to run cars on a simple mileage basis? Having investigated the subject thoroughly, I am prepared to prove that private car companies earn about *twice* as much mileage as common cars do. The also build special cars, which possess many advantages over common cars, and are in great demand.

This, in my opinion, will always be a necessary evil. In the United States there are about 815,000 freight cars, valued at about $244,500,000, which should earn $57,000,000 per year in car mileage. Now in order to shut these few private car companies out, we would be compelled to reduce the rate, which would cut the revenue down from all these cars, involving a loss on an immense amount of capital. I do not see why railroads should object to private car companies until they are willing and able to build these special cars and operate them. In looking at this matter it will be necessary to rise above this prejudice against the comparatively few lucky private car companies, and consider how any rate would affect cars known as common cars. With the present car service the mileage made by cars in common service is not quite large enough, but with improved car service, which must come in the near future, I believe the rate of ¾ cent per mile is about correct. It will be sufficient to keep a car in all necessary repairs and ultimately pay for itself. This would afford each road rolling stock with which to do business at, you might say, no cost. As cars are absolutely necessary to railroads, the use of them without cost would certainly be equal to a good interest on the investment. The question of a reasonable interest on investment, in addition to the car paying for itself after furnishing all necessary repairs, would be a complex and dangerous one, as it would leave a margin for speculators to work on. Under present circumstances and car service now existing, I believe the present rate of mileage is correct for cars in general service. E. C. SPALDING,
Car Accountant, Western & Atlantic Railroad.

A Curious Iron Rail.

The extraordinary iron rail illustrated herewith was gotten into its present state by only 14 months wear on the Manhattan Railway on what is known as the Maiden Lane curve, which is—for the Manhattan Railway—a very easy one of 500 ft. radius, or about 11½ degrees. The rail weighs 70 lbs. per yard, and will be seen from the side flange-wear to have been on the outside of the curve. While the wear illustrated (which is correctly represented in natural proportion by the lines above the engraving) is decidedly more marked than any other in the vicinity, there were several instances of very similar wear in the neighborhood, including some symptoms of it in the body of the rails.

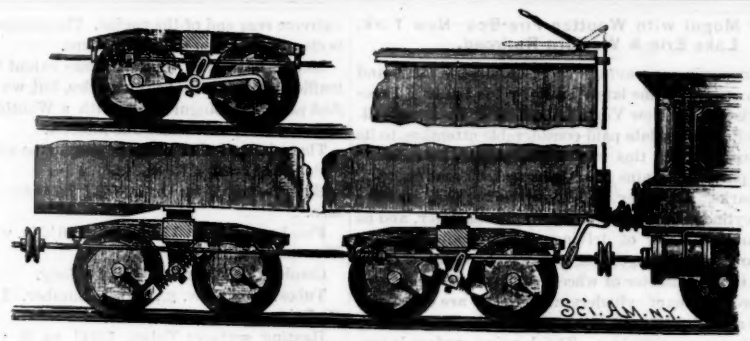
The peculiarity of it consists, of course, in the double jump which the wheels took after passing the joint. Single spots like the one nearest the end of the rail are rather the rule than the exception, after the rail has been in service long enough, but that the wheels should take a second clean jump, over a spot in the rail which is hardly worn at all, and make a second excavation beyond is rare enough, especially with such light rolling stock as that of the elevated on such heavy rails.

The chief provoking cause, beyond question, for the peculiar wear was that trains at this point were approaching a station and always had the brakes on. This probably gives a tendency to jump, but the brakes are never applied with force enough to slide the wheels, nor even approach it very nearly, so far as we have observed. The vexed question of supported *vs.* suspended joints can hardly enter into the question, for this joint was both, there having been three ties close together under the joint, according to the usual practice of the elevated; one directly under the joint and one on each side, the further edge of which would reach just about to where the end of the angle-bar came, as indicated by the worn spot on the base. The ties through the body of the rail are only 8 in. apart in the clear, with 8 in. face.

The rail appears to be of good quality and no complaint is made in this respect, although the extent of the wear was probably due in part to some peculiarity of the metal, since the same tendency did not go nearly so far in other cases. We have no theory to present in explanation of the tendency, but leave that question to the speculations of the curious. Exaggerated examples of a common tendency, however, often give most instructive evidence of what the real cause is.

Testing the Hardness of Tires and Rails.

Many engineers have experienced the want of a ready means of testing mechanically the relative hardness of tires, rails and other parts subjected to wear. Mr. G. A. A. Middelburg, of Amsterdam, Holland, says in *Engineering* that he

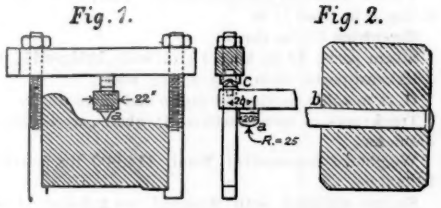


MORROW'S CAR BRAKE.

has used the apparatus shown in the inclosed sketch for some years with very satisfactory results.

A knife *a* (see sketch) of hardened steel, ¾ in. long, with curved edge, is pressed by lever and weight *b* on the surface of the metal, leaving there a line of a certain length, proportionate to the hardness of the metal. The range of the impression is about $\frac{1}{16}$ in. for copper and $\frac{5}{16}$ in. for hardened steel, and may be accurately measured. For softer metals a lighter weight *b* might be chosen.

The dimensions given on the sketch are in millimetres, and consequently the radius of the cutting edge is about $\frac{33}{64}$ in.,



Testing Hardness of Tires and Rails.

while the length of the knife over its cutting edge, measured in a straight line, is $\frac{31}{64}$ in. In order to obtain uniform results, the steel knife should be made of exactly similar dimensions in different machines. Unfortunately Mr. Middelberg does not give the cutting angle of his knife, and it is of course important that this should be precisely alike in all the machines. Unless it is, the results obtained with two different machines cannot be compared.

The construction of a very similar machine for the purpose of testing the hardness of rails has been suggested in the editorial columns of the *Railroad Gazette*,* but with the use of a falling instead of a stationary weight. Possibly some of our well-known tool makers who make a specialty of accurate gauges might find it worth while to make a standard little machine on this principle especially suitable for testing tires and rails. One of our largest railroads is taking up the question as regards testing rails.

Morrow's Improved Car Brake.

Whether the interesting and plainly meritorious brake which we illustrate is to be entered for the coming Burlington tests or not, we are not advised, but it is to be hoped that it will be, as its unique and strikingly original features would probably enliven that otherwise humdrum occasion with a great many novel experiences. As with so many other ingenious novelties of the kind, we first learn of this through the *Scientific American*, to which we are indebted for the original of our engraving.

"This brake is designed for use in connection with passenger cars as an auxiliary brake, *adapted to stop the train suddenly when necessary*," the *Scientific American* assures us, except that the italics are our own. "When used in connection with freight cars, it serves all the purposes of an ordinary brake, and yet is capable of instant application, to *thoroughly* brake the train when moving at a high rate of speed. Fastened to the axles of the car near the inner face of each wheel is a second wheel, formed with a toothed periphery, as shown in the engraving."

We then learn that there is an arm, as shown, encircled by springs "to relieve the shoes and arms from the sudden shock"—a very thoughtful provision. Then there is "a rod," between the car wheels and toothed wheels, projecting beyond the ends of the car and provided with buffers. The rods are "suitably connected" with the "brake-blocks" on the rocking arm, and are operated throughout the train by a cylinder under the tender, as shown.

"The rearward movement of one of the rods causes the shoes on the forward trucks to engage with the toothed wheels, and therefore *almost instantly* stop the train," we are told. "The consequent shock is *somewhat relieved by the wheels of the rear truck* of each car, which are left free to revolve. By means of simple connections the brake can be operated from either the top or platform of a car. *Provision is made for preventing the bending of the axles* under the strain brought upon them"—another thoughtful provision, but as to just what it is we are left in doubt.

It occurs to us that a modification of this device for attaining the same end in much the same way, but in a somewhat simpler way, would be to have an anchor to drop from the rear end of train and engage with the ties. Provision for preventing the bending of the ties "under the strain brought upon them" might probably be devised as simply as for the axles, and by having a good long spring to ease the shock when the anchor came to a bearing, in addition to the relief which would come from the draw-springs of the entire train without any expense at all, a train might easily be brought to a stop within 15 or 20 feet from an ordinary passenger speed, if something did not give way. But there might be trouble with this device in winter, when the ground is frozen and covered with snow, so that the one illustrated is better.

Those wishing to substitute this simple and durable device for the costly and complicated devices now in use, which do not even pretend to stop a train "almost instantly," can obtain further information—if the *Scientific American* speaks as truly in that matter as it does in describing the device—of Mr. John Morrow, the patentee, box 88, Philadelphia, Pa. Send for a circular with fuller details.

* See page 404, June 11, 1886.

The New England Railroad Club on the Interchange Rules and Wheel Centres.

The regular monthly meeting of the Club was held on the evening of the 8th inst.—President Marden in the chair; 65 members present.

The Secretary read general communications and the President and Vice-President reported that they had attended the last meeting of the Railroad Club at Chicago, as members of the Committee appointed for that purpose, that they were very cordially received, and that they were much gratified at the condition of the Club there, at the activity and intelligence of the members in railroad matters, and the interest displayed in their discussions; that the members seemed to be in favor of thorough inspection of cars and keeping the rolling stock in good condition; and that the Club gave evidence of a prosperous future.

The President also reported that he visited Detroit, to attend a meeting of the Buffalo Club, where the Rules of the Master Car Builders' Association were under discussion; that a committee was appointed at that meeting to effect a permanent organization of the Club. He stated that the Western Club had appointed a committee to discuss thoroughly the Rules, and after a time to present the result of their labors to the Club for indorsement, after which the matter was to come before the Executive Committee for presentation at the next annual meeting of the Master Car-Builders' Association.

DISCUSSION OF THE INTERCHANGE RULES.

The PRESIDENT called attention to two points in the rules which had been under discussion at the afternoon meeting, one of which was the repair of cars with raw material, and the other was in regard to the making out of bills for repairs at rates different from those prescribed in the rules.

Mr. LAUDER—I am very glad that Mr. Clark and others have taken the stand they have in regard to appliances for the safety of trainmen. It shows that the position taken by quite a number of roads here in the East is entirely right in this matter. I feel sure that if it were properly brought before the different clubs and discussed, we could arrive at an understanding that would result in our cars being put into a satisfactory condition.

Mr. FLETCHER—The National Dispatch Co. has had a great deal of trouble from the use of wrong material. We have had good new cars come back repaired with wrong material—oil boxes too small put in, draw-bars two or three inches too short, or so small as to render the car unsafe to run, and various things of that kind; but it is impossible to locate them, and this is a sore evil. We have collected perhaps a cord of foreign draw-bars that we have taken out in this way, and it is a heavy burden. It is all wrong.

Mr. ADAMS—This matter is provided for in the rules, and there would be no trouble in tracing these things if people were honest with each other. We have sometimes had trouble, on getting cars home, where wrong material has been put in; that is, material not in accordance with the rules, not like what the car originally had in, and we could not ascertain where it was done. If the person making the repairs, if he puts in any wrong material, would attach a card to the car, as required by the rules, there would be no difficulty. That is done invariably on our road; and where it is not done, it shows either an ignorance of the rules, or a disposition to be dishonest.

I am glad to see that the western roads are waking up to this matter of the safety of trainmen. The eastern roads have done considerable in that direction, and it would be for the interest of all the roads if they would follow suit. And if all the roads would insist upon their cars being in first-class running order it would facilitate the movement of freight more than anything else that could be done. I have been told of cars just built, where the different wheels varied over an inch. With regard to spiked ladders, a prominent car building corporation have turned out thousands of cars where the spikes were driven in perhaps not half an inch into hard wood. You could pull them out with your hand. I wrote to them and told them they were guilty of manslaughter, but never got any reply. As long as such things are allowed to continue our trainmen will be in danger.

Mr. FLETCHER—We have tried always to be very particular about our ladders and running boards; and we have been subjected to much expense and delay on account of ladders being bent in, so they have broken the sheathing, caused by a car backing up against the bulkhead and bending the ladder rounds in. If a train man attempts to get to the top of a car in that condition he may endanger his life.

The PRESIDENT—I don't think this matter of repairs of cars can be talked about too much. If we could get out more on to other roads in different parts of the country, and induce the western people and the southern people to come here and look at the working of our roads, and if people in different parts of the country would meet and talk these matters over, we should find that we are not so far apart after all. It is a good sign that the western roads are taking up this matter, and presently it will be seen that the eastern roads are not, as has been asserted, too strict in the matter of inspection.

STANDARD SIZE OF WHEEL CENTRES FOR STEEL-TIRED CAR AND ENGINE TRUCK WHEELS.

Mr. LAUDER—Steel-tired wheels have come into such general use within a few years that we ought to adopt some definite standard for the makers to conform to. I think that the size of the wheel centre should be established, and not the diameter of the outside of the tire when new, because some will want 2-in. tires, some 2⅛-in., and some 3-in.; and if you make the outside diameter the standard, the wheel-centres must vary according to the different thicknesses of the tires required. Again, chilled wheels reduce very little in diameter by wear, while steel-tired wheels are capable of being reduced perhaps 3 in. in diameter before they are worn out. Take a 33-in. wheel, which has been the standard size of car-wheel from time immemorial, with a 2⅛-in. tire on it; that tire will run down to an inch thick, that means a reduction in the diameter of the wheel of 3 in., so at last you are running a 30-in. wheel, and that means more rapid revolutions, more friction, and more liability to heat. It seems to me a 33-in. wheel should be 33-in. mean diameter; that is, when it is half worn out; so that a wheel originally 34½-in. in diameter, when half worn out will be 33-in. in diameter. If we start with a 28-in. wheel on an engine, it will be 26 when it is worn out. If a locomotive will take a 28-in. wheel, we can easily start with a 29 or 29½-in. wheel in it, and when worn out will be down to 27. If we order a 36-in. car wheel, when worn out it will be down to 33. We have lost the benefit of the larger size, and it always seemed to me there was not difference enough between a 33-in. and a 36-in. wheel to warrant making the change. We have just ordered a 36-in. wheel for some parlor cars; that is, a 32-in. wheel with a 2-in. tire. When worn out it will be somewhat larger than 33-in. I believe in a 42-in. wheel; we have some running, and they work well. If we could have a 48-in. wheel I should like it; but we cannot get one larger than 42-in. under an ordinary car. I think if we should start with 29½-in. wheels under our engines instead of 28, it would be more satisfactory. If there should be a uniform standard of wheel centres established, it would be an advantage to the wheel makers.

Mr. ADAMS—I suppose one of the most desirable things is to get a uniform wheel for passenger service all over the country. 42-in., 36-in. and 33-in. wheels are quite commonly used now; perhaps other sizes are used. I think there has been more theory than fact in regard to the 42-in. wheel being so much better than any other wheel, about its doing so much more service, and carrying a car so much easier than a smaller wheel. My experience has been almost absolutely to the contrary. I doubt if any person traveling on a car could tell the difference. In crossing such a place as the Providence crossing down here, where there are five or six tracks and a good many frogs, in dropping into those openings there is a difference in favor of the larger wheel, and in going over a frog there may be a slight difference; but those differences are so slight, I don't think they are much of an argument in favor of the 42-in. wheel. It occurred to me that it might be possible to make the centres of our wheels alike; that is, one class of wheels; and for other classes it might be necessary to make a different sized centre. The main object of getting a uniform centre would be to enable the car makers to make up a large quantity of tires in advance and have them in stock; and centres might be made up in the same way; the difference would be in the thickness of the tires; the inside diameters would be the same. It seems to me very desirable to get a uniform standard wheel for the passenger service of the country. There is a great advantage in a 36-in. wheel. Most roads that have used steel wheels have two kinds of trucks, one for 42-in. wheels and one for 33-in. A 36-in. wheel will go into either of those trucks without any great change. If you could adopt a standard for wheels to go in without any material change, it would be quite economical. I am satisfied that the 42-in. wheel does not make mileage in proportion to its additional cost over the 33-in. wheel.

Mr. SNOW—What the wheel makers would like would be to have the association decide on the size. We are making 33, 34½, 36, 37½, and 42 in. steel-tired wheels for passenger service, and a variation below that for tender wheels. We have been making tender wheels half an inch larger than the specification called for. When we began to make the steel-tired wheel for passenger service, our first patterns were made to correspond, a half inch larger than the size called for; but afterward, in order not to be different from other makers I arranged to make our wheels the size of theirs. It seems to me that we should take the outside diameter for the standard and not the inside, from the fact that wheels vary so much in construction. Some have no solid centres at all.

Mr. CONEY—I agree with Mr. Snow. There are some steel-tired wheels that practically have no centre. With the wheel that I represent we can make any kind of centre up to 42 in. without any trouble. Some could not do that without considerable expense and trouble. If there were an established size for the outside of the wheel, we could always give the purchaser what he wanted.

Mr. ELLIS—It seems to me that the matter of the inside diameter of tires is of importance to the tire maker, as affecting the making of tires for stock.

Vice-President LAUDER—I still adhere to my view that the wheel centre is the proper place to establish the size. I see no reason for any confusion, as regards the different wheels I am familiar with. The Allen paper wheel has a centre that is forced into it; Mr. Snow's wheel has a centre; the Paige wheel has substantially a centre; the tire sets on two plates, and the outside diameter of those plates gives the diameter of the centre. Every wheel with a loose tire set on the centre has a centre. Of course a centre could not be established for wheels that have the tire welded on. I think there will be confusion if you attempt to establish the diameter of the outside of the wheel, because different people will require different thickness of tires. I think we should take the outside diameter of the wheel centre as the standard for measurement. I agree with Mr. Adams that it is desirable to establish a standard passenger car wheel. I should prefer to have it as big as convenient to put under a car. I was struck with Mr. Adams' admission that there is a perceptible difference in passing over the Providence crossing, as regards the size of the wheels. Now a wheel will strike to the same extent into every joint on the road, and there is one every 30 feet; and I think this admission carries with it the idea that a 42-in. wheel gets over every joint easier than a 36-in. wheel does. I think a 42-in. wheel will skip over these bad places.

Mr. ADAMS—I doubt the additional power.

The CHAIRMAN—I have no doubt the 42-inch wheel will haul the easiest. And I have yet to have the first case of a hot box where a 42-in. wheel has been used; while under similar cars, of the same weight, with 33-inch wheels, we have been troubled with hot boxes.

Mr. MARDEN—I never have been an advocate of the 42-in. wheel. My experience with them in cars coming to us is that they will flange-wear quicker than a 33-in. wheel, and I don't think they will give the service that a 33-in. wheel will. I should be willing that a 33-in. wheel when half worn out should be adopted. I believe that a 42-in. wheel draws harder, especially up a grade; and as far as hot boxes are concerned I have not had much trouble with them with 33-

in. wheels. I am not yet in favor of even a 36-in. wheel, but I do believe in fixing upon a standard size of wheel centre.

Mr. ADAMS—I agree with Mr. Lauder that a 42-in. wheel is less liable to hot box than a 33-in. wheel; but Mr. P. H. Dudley told me that a 42-in. wheel was not economical for us to use, in regard to power; that with a road as heavily graded as ours it would cost more money to run with 42-in. wheels than with 33-in. On a level track, he says there is three or four per cent. saving in power; but when you strike a grade you lose immediately, because you have to lift the additional weight over that grade, and it takes power to do it. I prefer a wheel larger than 33-in., but 42-in. I think is inconveniently large. When the tire of a 42-in. wheel gets too thin to be used with safety under a passenger train, you can't put it into a freight train; but if it was a 36-in. wheel, and worn down two or three inches, you could get from 50,000 to 100,000 miles wear out of it.

Mr. RASKILLS—I think the centre should govern the size of the wheel, as that will govern the outside diameter, using the same thickness of tire. But if you adopt the outside diameter as the standard, you have got to carry a surplus weight of metal on some wheels. Increasing the size of the wheel will, of course, add a little to the cost, and also give greater weight.

Mr. SNOW—In order to get this matter squarely before the club for discussion, I will move: That it be declared as the sense of this club that the following should be the standard diameters of wheel centres for steel-tired wheels; for so-called 33-in. wheels, 30 in.; and for so-called 36-in. wheels, 33 inches.

Mr. ADAMS—I would like to ask Mr. Snow if he has in view a 2½-in. tire.

Mr. SNOW—Yes, sir.

Mr. ADAMS—Wouldn't it be cheaper to use a thicker tire?

Mr. SNOW—The difference in the tire changes your brake leverage considerably. It has been conceded that a 2½-inch tire was about as thick as was necessary. There are tires much less than that. A 34½-in. wheel when half worn out, becomes 33 in., and your brake leverage is adjusted to that.

Mr. ELLIS—It is important to car builders to be able to make a comparison in prices of different wheels. Some makers sell a 34½-in. wheel for the same price as a 33-in. wheel. They can't afford to do that; there is a difference in the cost. As regards the cost, I think the centre of the wheel is far more important than the diameter.

Mr. LEACH—It seems to me that the most important thing is to fix the standard thickness of the tire. That would be a standard for the outside and the inside, too, and all would be pleased.

Mr. PROSSER—It seems to me necessary to designate what constitutes the centre of the wheel; there is quite a difference of opinion about that. I have considered the centre to be the shrink place; some say it is the outside of the plate.

Mr. CONEY—If you adopt a certain centre, some wheel-makers can't make it. A uniform thickness of tire would be better for us all; ¼-in. thickness of tire means $5 difference.

Mr. PROSSER—I think the 42-in. wheel is to be the wheel of the future, both for freight and passenger service. On the other side of the water no wheel is used less than 40 in. under any kind of equipment.

Mr. Snow's motion was adopted.

The CHAIRMAN—It is a question still unsettled by the different roads as to what is the best thickness of tire. A good many roads have been using tires four inches thick for locomotive driving wheels of late years. At the last meeting of the Club in Chicago, some figures were presented, showing much more wear of 4-in. tires than of 3-in., in engines of the same class, doing the same kind of work. And on two engines, just alike, in the same service, that with the 3-in. tire came within 2,000 miles of the one with the 4-in tire before wearing out. You can't get a 4-in. tire so uniform and well compressed as one of 3-in. We are not yet prepared to vote on the thickness of tire, because we don't know what is the best thickness. We shall have to experiment more first.

Mr. COLEMAN—I will mention a little fact that came to my notice the other day. A workman in a factory where hydraulic pressure is used, put his chisel under the press, and applied the whole force of the pressure; and on taking it out and using it, found its efficiency immensely increased, so much so that it has been used for months' without touching, in work where ordinary tools dull almost immediately. Now if this process could be applied to steel tires in their manufacture, we should see results that have not been seen with any tires hitherto made.

The committee appointed for that purpose, reported a series of resolutions upon the death of Leander Garey, which are given elsewhere.

Mr. RICHARDS—I move that the diameter of centre for all carrying wheels be 3 in. less than the nominal diameter of the wheel, with the exception of 42-in. wheels. The idea is to have the wheel its nominal size when the tire is half worn out.

Mr. ELLIS—That figuring makes the tire ¾ in. thick when it is worn out.

Mr. ADAMS—Would you run a steel tire down to ¾ of an inch in thickness under anything?

The CHAIRMAN—I should not. What Mr. Snow means is that the mean diameter of the wheel of 30-in. centre should be 33 in.

Mr. PROSSER—Why do you omit the 42-in. wheel?

Mr. RICHARDS—It is difficult to get a 42-in. wheel under a car and make a good job. There is not room. If you use it, make it 42 in. on the outside when new. If 2¼-in. tire is used, make the centre 37½ in.

The CHAIRMAN—I should prefer 40-in.; it is difficult to get a 42-in. wheel under the trucks, and get the car down so that it will couple with other cars.

Mr. ELLIS—I move an amendment to Mr. Richard's motion, that the centre of the 42-in. wheel be 36 in.

Mr. RICHARDS—I accept the amendment.

The CHAIRMAN—The motion as it now stands is,—That the diameter of wheel centres shall be 23 in. for 26-in., wheels—25 in. for 28-in. wheels—27 in. for 30-in. wheels—30 in. for 33-in. wheels—33 inches for 36-in. wheels and 36 inches for 42-in. wheels; and that it is the sense of this Club that those sizes shall be adopted for steel-tired wheels for passenger and freight use.

Mr. PROSSER—This question of where the centre ends and commences ought to be decided. I ask Mr. Richards if he considers the centre of the shrink place the centre, the point where the tire is shrunk on to the centre?

Mr. RICHARDS—In paper wheels I should call it the bore: in the Paige wheel I should call it the plate; in the wheel with the Mansell retaining ring, I should call it the broad bearing on which the tire rests.

Mr. KELLS—I think it is important to decide where the thickness of the tire is to be measured. If it is to be measured over the rail head, on a Paige wheel the tire would be 4 in. thick, and on the Prosser wheel 3 in. thick.

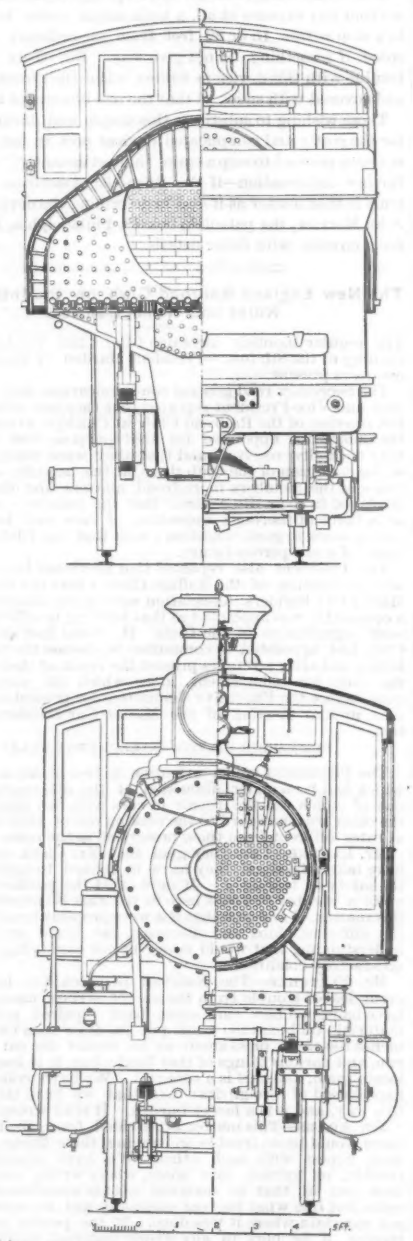
The CHAIRMAN—I think that is an imaginary difficulty. There can be only one inside centre; the diameter of that is the diameter that comes in contact with the centre.

The motion as amended was passed.

It was voted to consider at the January meeting the best methods of heating and lighting cars in passenger service. The meeting then adjourned to the second Wednesday in January (Jan. 12).

Passenger Mogul with Wootten Fire-Box—New York, Lake Erie & Western Railroad.

The accompanying engravings represent a very large and powerful passenger engine lately built by the Baldwin Locomotive Works for the New York, Lake Erie & Western Railroad. This line has of late paid considerable attention to its passenger business, and this engine is specially intended to haul heavy passenger trains at a high speed without emitting smoke or sparks. In order to secure the requisite tractive power, the cylinders are enlarged to 20 in. diameter, and as the stroke and diameter of driving wheel remains the same as in ordinary fast passenger engines which possess a 24-in. stroke with 68 in. diameter of wheels on tread, the speed—as far as the proportions of cylinders and wheels are concerned—should be as high as can be attained with the best existing types of fast passenger engines. The heating surface is considerable, nearly 1,500 sq. ft., so that the steaming power of the engine should be ample. Sufficient adhesion has been secured by the use of six coupled wheels which have a total weight of 95,300 lbs. upon them, or fully 45 per cent. in excess of the adhesion weight usually provided on fast passenger engines, while the tractive force would be only about 25 per cent. in excess of that of engines having 18 × 24 cylinders and 68-in. wheels. Ample provision thus appears to have been made so as to enable the engine to haul a heavy train at a good speed up the long and heavy grades found on some parts of the Erie. Going west the principal grades are as follows:



Passenger Mogul Locomotive with Wootton Fire-Box.

Miles.	Average grade. Ft. per mile.	From
12⅛	51	Hornellsville to Tip-Top.
7	53	Deposit.
8	56	Up to Otisville.
	GOING EAST.	
7⅛	61	Susquehanna.

In order to avoid any nuisance from smoke and cinders, it has been determined to use anthracite coal, and to burn it in a Wootten fire-box. The result of this combination of somewhat, but not altogether, novel features in a fast passenger locomotive is seen in the accompanying engraving.

It will be noticed that, as in the most recent Wootten engines, the fire-box top is horizontal and not inclined downward toward the back end as in earlier examples. The steam dome is placed completely forward of the cab, and being outside the cab is not so hot as on the Philadelphia & Reading engines, where the dome is placed inside the cab. The fireman is sheltered by an iron cab on the tender.

The Westinghouse pump is secured inside the frame at the extreme rear end of the engine. The position of the sand-box is clearly shown in the illustrations.

Moguls have been used to some extent for fast passenger traffic on lines with heavy grades, but we believe this is the first passenger Mogul built with a Wootten fire-box, and as such it possesses considerable interest.

The principal dimensions of the engine are as follows:

Gauge of road: 4 ft. 8½ in.

Boiler, steel, ⅝ in. thick, 57⅛ in. diameter, straight pattern.

Fire-box: of steel, 114 in. long, 96⅛ in. wide, 38¾ in. deep Wootten patent.

Combustion chamber: 34$^{5}_{16}$ in. long.

Tubes: iron, 14 w. g., 336 in number, 1½ in. diameter, 9 ft. 5⅜ in. long.

Heating surface: Tubes, 1,241 sq. ft.; fire-box, 181 sq ft; combustion chamber, 36.5 sq. ft.; total, 1,458.5 sq. ft.

Cylinders: 20 in. × 24 in.

Driving wheels: 68 in. diameter; centres, of cast iron, 62 in. diameter.

Driving axles, of open-hearth steel; driving journals, 7½ × 8½ in.

Grates: Philadelphia & Reading style; water tubes with cast-iron bars and drop plate.

Cross-heads: cast steel.

Guides: iron, case-hardened, Laird pattern.

Wrist-pins: steel.

Feedwater: One No. 9 and one No. 10 Friedmann monitor injectors.

Valves: Delancey pattern, travel 6$^{5}_{16}$ in., O. S. lap 1 in., I. S. lap $\frac{1}{32}$ in., lead ⅛ in.

Eccentrics, 5¾ in. throw.

Steam ports: 19 in. long, 1⅝ in. wide, bridges 1⅛ in.

Exhaust ports: 19 in. long, 2¾ in. wide.

U. S. metallic packing for piston and valve stems.

Truck: axle of open-hearth steel; wheels, steel-tired, 30 in diameter.

Weight of locomotive: Total, 114,000 lbs.; on drivers, 95,300 lbs.

Engine equipped with Westinghouse automatic brake for driving, tender and train wheels.

Tender: 3,200 gallons capacity, carried on two four-wheeled centre-bearing trucks. Frame, of oak; wheels, chilled cast iron; axles, open-hearth steel.

Weight of tender half full of water and with 2½ tons of coal, 58,400 lbs.

The Triangulation and Measurement of the Forth Bridge.

A paper by Reginald E. Middleton, M. Inst. C. E., in *The Engineer*, gives some details very interesting to engineers of the method of laying out this greatest of all bridges so far constructed, which was necessarily very carefully done, from which we extract the following:

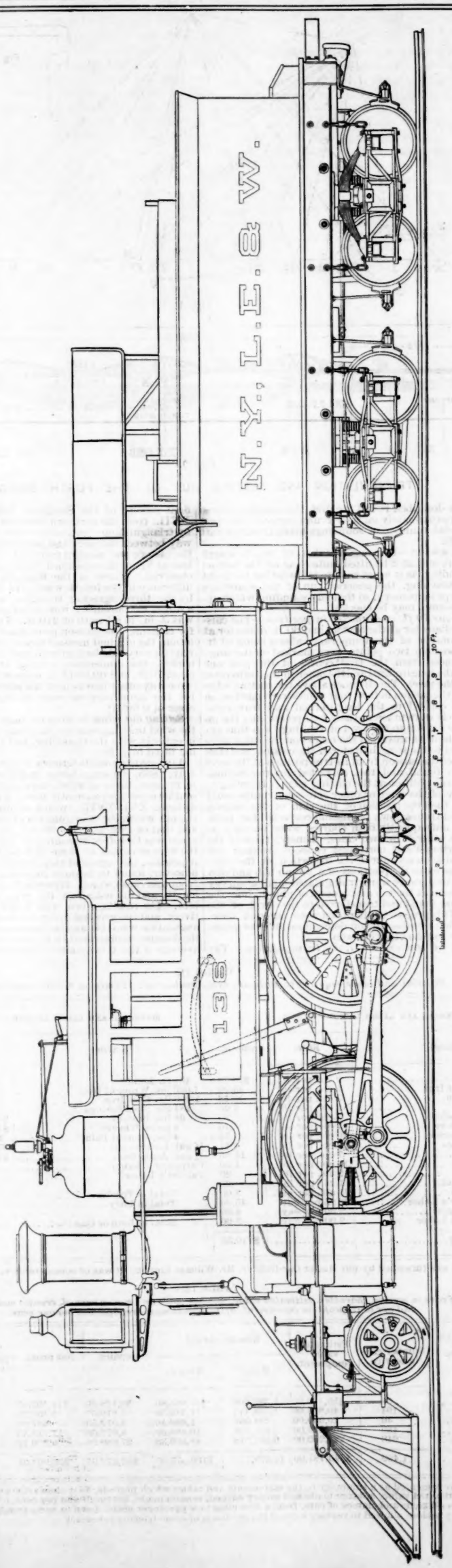
Fig. 1 shows the system of triangulation based on the axis of the bridge *A Z*; fig. 2, the general dimensions along the centre line. The total length of the bridge between centres of abutments is 8,080.5 ft., and the level at these points is about 110 ft. above Ordnance datum, the ground falling very rapidly in each case to a level of about 15 ft. above Ordnance datum. The distance from the south abutment to high-water mark is about 560 ft., and from the north abutment 1,785 ft., the distance which is inaccessible at high-water being approximately 5,735 ft., or one mile and one-twelfth nearly. At low water the distance is about 360 ft. less. At high-water the Island of Inch Garvie, at the centre line of the bridge, is covered, but a small brick pier had been built by the contractors for the old Forth Bridge, which is 54.71 ft. north of the centre line of the northern Inch Garvie piers, which gives an accessible point there at all times of tide. This point, called *B*, is 4,024 ft. from the south shore and 1,711 ft. from the north shore, or thereabouts.

Base line.—The base line was measured from the point I in the centre line of the bridge, near the face of the south abutments to the point *P*, over some pretty rough surface. The two ends of the base line were, unfortunately, not visible from each other at the ground level, therefore high poles had to be used for sighting; and though every care was taken to place and keep the poles vertical, some slight error may have crept in. The approximate length of the base line was 4,000 ft. An observatory was located at *O*, on the outer end of a rough stone jetty. The ordnance survey inserted the points *A*, *B* and *C* on the centre line. The distances thus measured were given by the Ordnance Department, as being: *A C*, 7,607.37 ft.; *A B*, 5,401.45 ft.; *B C*, 2,205.92 ft. The distance *A I*, as measured with standard chain, was given as being 846.75 ft., and *C D*—*D* being a point near the Fife piers—as 501 ft.

Commencement of setting out piers on north side.—It being desired to commence operations on the north side, the above measurement from *C* to *D* was taken as correct, and the centre for the northern Fife piers set out from it. This distance, when measured with standard rods, was found to be 0.79 ft. too short, the true dimension being 501.79 ft., and this caused the whole structure to be set out 0.79 ft. south of the setting as originally proposed.

Standard rods.—The rods when delivered were corrected to a standard length, for want of better appliances, with a female gauge made of iron tipped with steel, fitted at the time of measurement to two 6 ft. boxwood rods supposed to be standard, and checking the same by means of steel tapes and boxwood scales. The boxwood rods being laid on the bed of a planing machine, the female gauge was made to fit them, and immediately transferred to the rods to be made standard, which were adjusted to it by means of hard wood wedges provided in one end of each rod for this purpose. Each rod was treated in this manner, and the whole was then checked with the steel tapes and a length set out with 12-in. scales on the machine bed and the whole averaged, the gauge was again adjusted to these rods and put by for future reference. Any error such as would be likely to exist in these standards would not have been of the least importance, as both the foundations and steel works would have been set out from the same standards, if it had not been that the main points of reference were set out from the Ordnance Survey, necessitating that survey being taken as the standard of length for the whole. What the differences were, and how they affected the structure, will appear below.

Measurement of base line.—At first the rods were supported on blocks of wood, each rod being approximately leveled transversely, and then brought to a level longitudinally by means of packings of wood laid under it, the level used



PASSENGER MOGUL LOCOMOTIVE WITH WOOTTEN FIRE-BOX.

Built by the BALDWIN LOCOMOTIVE WORKS *for the New York, Lake Erie & Western Railroad.*

being an ordinary mason's level. This arrangement was found to be both tedious and liable to accidents and error, and though frequent bench marks were plumbed down and secured, a good deal of work had to be done over again. Wooden trestles, with two cross-bars each and of varying lengths, were therefore made and driven into the ground, and the rods rested on them, two trestles to each rod. The line from the works to South Queensferry Station is straight, but falls with an even gradient of 1 in 70 towards Queensferry, and this gradient, if followed regularly, is just enough to prevent the rods facing. It was therefore necessary to lay a length of three or four rods level, and then make a drop, which, in order to introduce a plumb-bob or the square, which was frequently used for bringing the faces of the rods into a vertical plane, and which will be described with the other tools, could not be less than 5 in. The rate of progress was at the commencement about 24 ft. an hour. The highest rate attained was about 86 ft. per hour, and the average about half the last amount. At the end of each period of measurement a strong peg was well driven into the ground, and a nail put into the head of it where the measurement ended. The distance from the last peg and nail was taped, and that distance added to former measurements and recorded. The total length of the base line *I P* as measured by the rods was 4,013.2 ft. While the above measurement was being made a staging was in course of erection at O, sufficiently large to support an observatory. When the main base line was completed a rough measurement was made from the termination of the former at *P* to the site of the observatory at *O*. This line *P O* was much more difficult than the former, and as this measurement was only required as a check, the same amount of accuracy was not attempted as in the main base line, only the portions of ground which were easily measurable with the standard rods being set out with them; the rest of the distance, about 900 ft., was measured with a steel sounding wire.

Measurement with wire.—In order to use the wire, a distance of 300 ft. was accurately measured with the rods on the stage leading to the observatory. The wire was laid on this, a mark having been previously made near one end by means of a piece of copper wire twisted round the steel and soldered on; it was pulled straight and a similar mark was made at the other end. The wire was then transferred to the place to be measured, stretched from the last fixed point, set straight with the theodolite, and held in place by its being lashed to two of the trestles already mentioned as being used to support the rods, these trestles being again lashed to other shorter trestles placed behind them. The accuracy of the starting point was tested by the plumb-bob, and corrected by tightening or loosening the lashings of the trestle nearest *P*. The difference of level between the ends and the centre was taken with a spirit level, and the distance was marked down, calculated, and booked. The wire was then tested for length on the standard laid down on the stage, and the error, which was a gradually increasing one, and eventually amounted to 9 in., was also booked.

Error in line P. O.—The results of the whole measurement between *P* and *O*, amounting in distance to about 3,000 ft., could only be looked on as an approximation. It was, however, eventually found to be correct within about 2 in.

Triangulation.—A 7-in. theodolite was used, and when the distance *A I* was accurately measured it was found to be 846.77, against 846.75 by the chaining of the Ordnance Department. The distance *I C*, however, was found by triangulation to be 6,759.46 against the Ordnance 6,760.62 or 1.16 shorter. By comparison with 10 ft. rods the length of the base line was found to be 4,013.897 against the Ordnance triangulation 4,013.693, and by computation from *I C* 4,013.87. The net result was that the difference was not appreciably greater than 0.21 ft. in 4,000 ft.

Setting out piers.—The northside piers were set by direct measurement with standard rods, making *C* the fixed starting point in each direction. At each pier four stones were set in concrete and marked for reference. Benchmarks were cut in rock.

On the south side the same was done, starting from *I*, but with greater difficulties owing to the rapid slope. The measurement of the first 436 ft. was, therefore, repeated three times.

From *E* to XIV., having a point parallel with the centre line at 436.14 ft. from I and poles set to maintain the parallel line throughout, the measurement was continued up to the centre of No. 5 pier, and carried on the centre of the pier at XIV.

Preparations for wire measurements in situ.—To make wire measurements posts were built into stations XVIII. and XIX., and clips were fixed on them in the positions fixed for the centres of the piers. A theodolite station was fixed in such a position on the island that the axis of the instrument should be 24 ft. below the centres of the clips, and on the north side a marked board was fixed at the same level, so that it was only necessary to sight on the board, and the line thus obtained would give the proper deflection for the wire. It is true that there is a slight error for curvature, but it is so small that it may be ignored. On a perfectly calm day arrangements were made for preventing any shipping passing through the northern channel; the wire was fixed in the clips at station XIX., and was hauled across to the island, where it was brought up to the clips, so that the mark on the wire touched the face of the clips; it was, however, found necessary to draw in the wire 18 in. before the proper deflection of 24 ft. was obtained. The span then appeared to be 18 in. too short.

Result of wire measurement unsatisfactory.—This result was eminently unsatisfactory, but before it could be accepted it was necessary to refer the wire to its place on the railway, where, however, it fitted exactly. It was therefore necessary to look for the error elsewhere, and the writer proceeded at once to test the rods on the 300 ft. standard laid down on the stage leading to the observatory, when he found that the rods were 0.173 ft. longer in 300 ft. than they were when this standard was laid down; 0.173 ft. in 300 ft. is 0.9067 in 1700 ft., or 10⅞ in., leaving 7¼ in. still to be accounted for. The whole of this enormous error in the rods can in no way be accounted for at this particular time, for it was abundantly proved by later measurements that up to that time, with the exception of one measurement between stations XIX. and XX., the maximum divergence from the original setting had not exceeded 0.024 ft. in 300 ft. At the time of the wire measurement, the rods were checked from the iron gauge, and a small error may be accounted for by difference of temperature; but as the average temperature in February, when the guage was made, is 42 deg., and in October, 49 deg., this will only account for an error of about 0.014 ft. in 300 ft., or 0.078 ft. in 1,700 ft. It must be assumed, therefore, that the gauge had suffered some injury just at that time. The average error due to temperature would be from 43 deg. to 60 deg., or 17 deg., which would give 0.0335 ft. in 300 ft., or 0.19 ft. in 1,700 ft.; and it will be seen from the records of the rod tests that they do not increase in length with increased temperature to anything like this extent—indeed, their tendency is to become shorter during the summer months. Also as the increase in length of the iron gauge due to temperature was known and its effects on the setting out had already been called attention to, this tendency was counteracted, as far as possible, first by keeping the

gauge in the most even temperature procurable, and next by allowance in the setting of the rods. Of the 18 in. difference between the wire and the distance set out for a span of 1,700 ft. between stations XVIII, and XIX., 10⅛ in. has been accounted for, leaving 7⅛ in. unaccounted for.

Triangulation of distances A-I, I-VIII., I-E, I-XI.—In order to again check the distance *A-I* a short base line *I-R* 636 ft. long, part of the base line *I-P* was measured and the distance triangulated, the resulting dimension being *A-I* 846.857 as against 846.92, *I-E* 436.19 as against 436.214, I-VIII. 671.232 as against 671.245, I-XI. 1175.32 as against 1175.285, and I-XIV. 1690.36 as against 1690.285, the final measurement of the distance along the girders made it 1690.337. The measurement from XIV. to XV. could not be carried on in a line parallel to the centre line of the bridge, owing to the stage no longer following this direction, but turning inward and being in the centre line at XV. A pole was therefore placed on the stage in the centre line of the bridge somewhere near where the southern Queensferry Piers, Station XV., should come, and this station was triangulated from *O*. Three angles could not be taken, owing to the unsteadiness of the stage, and this unsteadiness affected the other angles, as the pole would not always lie in the centre line. The distance between *I* and this pole having been angulated, a direct measurement was made by squaring off from the centre of the south cantilever pier, station XIV., and fixing a point 88 ft. 4.9 in. from the centre line of the bridge, measuring to the pole already fixed, and calculating the base as that of a right-angled triangle. The results were, by triangulation, the distance XIV. XV. should 684.719, by measurement as above 684.725. This distance was repeatedly measured, and showed a constant elongation in the stage as under :

June 10, 1884	684.775
July 15, 1884	684.965
January 1, 1885	685.028
July 30, 1885	685.277

Therefore the stage had evidently moved northward in this period 0.353. There was also a movement northward at station XIV. of 0.151 total, 0.703 of this 0.441 had been corrected, leaving an error northward of 0.262 ft., or taking the averages of observations—

Direct measurement, July 30, 1885	2375.266
Triangulation, 1884	2375.334
" 1885	2375.312
Wire measurement, 1885	2375.380
Average	2375.323
Correct length	2375.004
Average error north	0.319
By direct measurement	0.266
By triangulation	0.323

From these figures it will be seen that a better result would have been obtained by trusting entirely to triangulation, and that in such a situation a direct measurement is not to be relied on

Setting out stations XVII. and Q.—The southern Inch Garvie piers, station XVII., being both, when built, situated in deep water, and there being at this time—June, 1883—no staging near them, and it being necessary to arrive at the contour of the rock on which the caisson would eventually rest, a station had to be set out which should be in the transverse centre line of these piers. For this purpose an arbitrary angle I XVIII. $Q = 48$ deg. *I Q* = 4240.40 ft., *Q*, being the new station, was decided on; this line was marked down in the rock, the angle from *I* which would intersect this line and the transverse centre line of the southern Inch Garvie piers in the same point was calculated, and this line also laid down with the theodolite, a masonry pier was built over the points so found, and the operation repeated and checked. The angle at *I* was necessarily very acute, and that at *Q* very obtuse. XVIII. I Q being 4 deg. 3 m. 18 s., and XVIII. *Q I* 127 deg. 56 m. 42 s., and therefore unfavorable for accurate measurement, the error in the position of Q was, however, not more than 1¼ south of true position.

Obtaining contour of rock at southern Inch Garvie piers.—The arrangements used for obtaining the contour of the rock at and about the sites of the southern Inch Garvie piers was a raft 69 ft. 8 in. diameter, the caissons being 70 ft. diameter : on this was laid a circular road, on which a carriage traveled, carrying the drum on which the sounding line was wound. There was considerable difficulty in finding a satisfactory sounding line. Copper wire stretched and broke, and three or four sinkers were lost and considerable delay caused thereby. Fortunately, most of these mishaps occurred in sounding round the northern piers, where no great accuracy was required. The sinker eventually used was made of a bar of ⅝-in. iron, 10 ft. long, with a lead weight cast on it about midway in its length, the whole weighing about 60 lbs., and the sounding wire was of steel 3/10-in. in diameter, and marked at the feet with pieces of copper wire soldered on, and with brass tallies tied on with string and stamped with the number of feet from end of sinker. A 28-lb. lead sinker was also used on occasion with sufficient wire attached to it to make the length the same. The tallies frequently broke off, and had to be renewed, but though wire and other attachments were tried, nothing was found to answer so well as the string.

Setting raft for sounding.—For setting the raft four moorings were laid down and the cables brought on board to four crabs, and at the times of high and low water—the utmost time for sounding being 1 hour and 30 minutes—the cables were hauled taut, a theodolite was placed at XVIII. and another at *Q*, the angles necessary for bringing the raft into position were laid off, and the cables manipulated until both instruments bore on the centre of the raft, and also the theodolite at *Q* on a nail placed in the circumference to serve as a starting-point, and to bring this point right two check ropes were used. The circumference of the raft was marked in feet, and the wire hanging 2 in. clear traversed a circle 70 ft. in diameter. An assistant was told off to read the tide gauge every five minutes, the traverser was set over the nail at the starting-point, the sinker lowered and the level of the water read; the sinker was lifted clear of the ground and traversed 1 ft. to the right, lowered again, and the same process repeated, one of the assistants on the raft booking the readings and the position of the traverser on the circumference of the raft at each five minutes so as to correspond with the tide gauge readings. If anything soft was met with, the sinker was dropped until it passed through it to the rock, and then brought to the surface and inspected as to the nature and thickness of the material passed through; frequent observations were also made with a tallowed hand lead to ascertain the nature of the bottom. The rate of progress was about two soundings per minute.

Contour of rock outside piers.—Where the raft was in the position the caisson would eventually occupy soundings were taken at every foot, and the whole circumference was gone over twice. As it was desired to obtain soundings for about 35 ft. outside the foundation of the caisson, the angle which would give 35 ft. was calculated for each theodolite, the full angle taken in the one case and one-seventh of it in the other and the raft shifted to this position and soundings taken at every 5 ft. of the circumference, then the angle on the first theodolite was altered one-seventh less, and that on the other increased one-seventh, and the raft brought into this position, and the process repeated until 28 circles of soundings had been described round the first, the centres of these circles being approximately on the circumference of the first circle. The total number of soundings taken from the raft was about 3000.

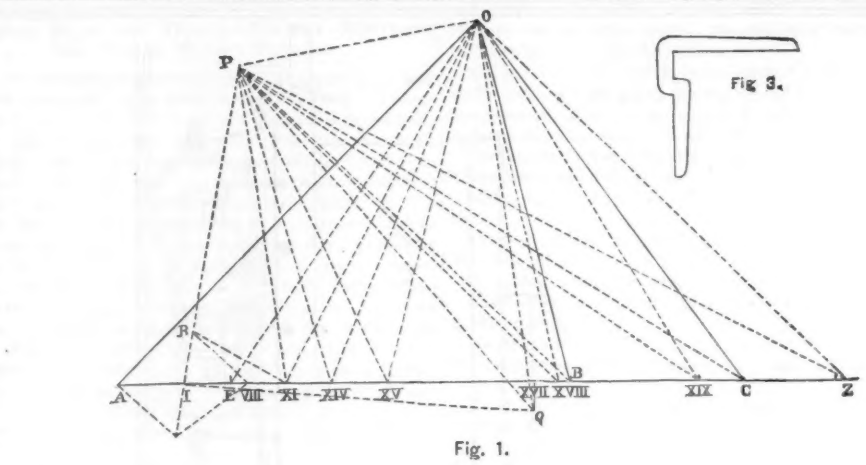


Fig. 3.

Fig. 1.

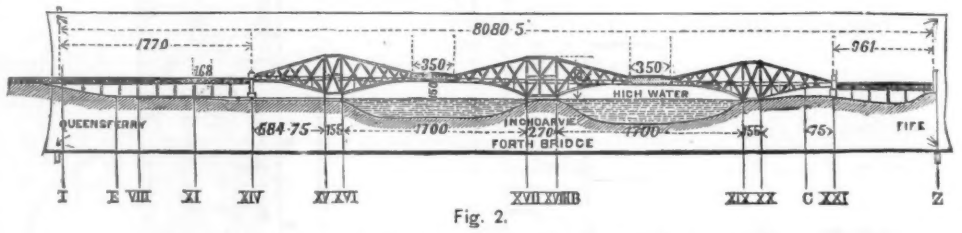


Fig. 2.

TRIANGULATION AND SETTING OUT OF THE FORTH BRIDGE.

Using 10 ft. sinker.—In using a sinker of 10 ft. length care must be taken that it be lifted quite clear of the bottom after each sounding, as it is not easy to tell whether the point or the head is touching, the general run of the soundings must also be kept in memory, so that any sounding which appears to be abnormal may be checked.

Setting caissons 70 ft. in diameter in position.—The caissons are 70 ft. diameter at the bottom and 60 ft. diameter at the top, the diameter of the temporary caisson being 61 ft. 8 in. Where possible two points were marked on the stage at known distances from the true centre of the pier, one point being in the longitudinal and the other in the transverse centre line of the pier. The distance above the cutting edge was marked on the caisson in feet; four points were marked on the top of the caisson in the longitudinal and transverse centre lines, levels were taken at these four points, and the inclination of the caisson to the level of the stage was thus arrived at; then the distances from the marks on the stage were taken and added to the semi-diameter of the caisson, and thus the divergence of the caisson from its true position at the level of the stage was found, and this, corrected by the inclination, gave the true position at the cutting edge. If owing to the unreliability of the stage or other cause this course could not be adopted, then the position of the skin of the caisson was triangulated from known points and corrected for inclination, and not unfrequently both courses were pursued as checks on each other. In two cases, namely, those of the Queensferry northeast and northwest caissons, neither system was applicable on account of the distortion of the caissons, and in these cases the positions of a plumb bob and of a point in the circumference were triangulated and a survey made of the caisson at the top and bottom of plumb line, the axis of the caisson found and transferred to the level of the cutting edge. This process having been gone through once, and the actual shape of the caisson determined, it was possible to proceed as for the other caissons.

Final setting of station XVII. by triangulation.—The final setting of the Southern Inch Garvie piers, station XVII., from the northern ones, station XVIII., was made by triangulation ; two points were marked down about half way between the piers and respectively in the centre lines of the eastern and western piers, all four sides of the quadrilateral figure thus obtained were measured, and all the angles observed. Three of the triangles agreed exactly, and the difference in the fourth was 0.012 ft. The dimensions given by the three agreeing triangles was accepted, and when a direct measurement was eventually made the difference was 3/32 in. in a length of 270 ft. The distance of the poles for centring the caisson piers apart was checked by triangulation, the original measurements having been made with the rods on very side-long ground and transferred with the theodolite, the dimensions arrived at by triangulation were 59.9976 ft. and 60.0043 ft. respectively for 60 ft. In the same way other marks near the north cantilever pier put in for the same purpose were triangulated with a resulting error of 0.002 ft.

Setting out wind bracing on Inch Garvie.—The lines for the wind bracing between Inch Garvie skewbacks were put in entirely with the theodolite, and the first half of the bracing fitted to 1/32 in.

Wire measurements between stations XVI. and XVIII.—In July, 1885, the stage being sufficiently set by the Queensferry piers, three of which were built, and the centres of the southern piers permanently fixed, it was decided to check the distance XVI.-XVIII., which, if correct, would be 1,969.912 ft., but which the triangulation of 1884 gave as 1,969.66 ft., and that of 1885 as 1,969.68 ft. By the wire a proper distance was therefore measured as before on the railway, and the wire stretched on three different occasions so as to test, if possible, the action of changes of temperature in it, it was, however, found to be quite impossible to deduce any result from this cause which, apparently, was not constant for the length, and did not affect the wire to any appreciable extent. The results given were 1,969.67 and 1,969.74 respectively, and the greatest difference between them and the triangulation was 0.08, and the least 0.01, the average being that the distance as measured by the wire was 0.035 longer than the average of the triangulated distances. On July 17, when

TABLE 11.

Material and labor required to build one first-class box car. Itemizing articles and expenses

MATERIAL AND LABOR IN BODY OF CAR.			MATERIAL AND LABOR IN PAIR OF TRUCKS OF CAR.		
Articles.	Rate.	Amount.	Articles.	Rate.	Amount.
3,987 ft. Lumber	2 cts. per ft.	$79.74	487 ft. Lumber	2 cts. per ft.	$9.74
704 lbs. Wrought Iron	5 cts. per lb.	35.20	1,000 lbs. Wrought Iron	5 cts. per lb.	50.00
606 lbs. Cast Iron	3 cts. per lb.	18.18	1,306 lbs. Cast Iron	3 cts. per lb.	39.18
100 lbs. Nails	4 cts. per lb.	4.00	184 lbs. Steel Springs	9 cts. per lb.	16.56
6 lbs. Flat Washers	6 cts. per lb.	.36	64 lbs. Brasses	22 cts. per lb.	14.08
10 lbs. Lag Screws	7 cts. per lb.	.70	4 pairs Wheels	$40.00 per pair.	160.00
½ gross 1½-inch Screws	30 cts. per lb.	.15	4 lbs. Mineral Paint	1 ct. per lb.	.04
46 lbs. Steel Springs	9 cts. per lb.	4.14	½ gal. Linseed Oil	75 cts. per gal.	.38
160 sheets Tin	7 cts. per lb.	11.20	¼ gal. Asphaltum	$1.50 per gal.	.37
8 lbs. Solder	15 cts. per lb.	1.20	Carpenter's Labor		5.65
2 lbs. Tin Nails	10 cts. per lb.	.20	Painter's Labor		.50
28 lbs. Mineral Paint	1 ct. per lb.	.28			
4 gals. Linseed Oil	75 cts. per gal.	3 00	Total in Trucks		$296.50
20 Days Carpenter's Labor	$2.25 per day	45.00	Total in Body		210.35
2 Days Tinner's Labor	2.00 per day	4.00			
1½ Day's Painter's Labor	2.00 per day	3.00	Total in Both or One Car.		$506.85
Total in Body		$210.35			

This statement was furnished by our Master Car-Builder, Mr. William Kinyon. It was of considerable value to me in some of my calculations.

TABLE 12.

Showing number of cars in service, character, estimated value, mileage made and money earned, repairs made, profit after repairs, and per cent profit on investment, after deducting all repairs, during one year.

Character of cars.	Number cars in service.	Estimated value equipment.	Mileage earned.		Repairs.	Net profit.	Per cent. profit on investment.	Rate mileage per mile.
			Miles.	Money.				
Passenger	38	$89,146.00	1,386,268	$27,886.80	$9,178.89	$18,707.91	21	2 and 3 cents.
Local box and cabs	194	49,885.00	1,508,443	11,313.32	5,493.75	11	11	¾ "
Stock	46	10,000.00	224 062	1,680.46	1,012.53	667.93	6⅔	¾ "
Coal and flat	489	166,200.00	2,651,466	19,885.99	8,672.66	11,213.33	6¾	¾ "
Green Line box	648	228,250,00	6,507,918	48,809.38	27,989.26	20,820.12	9	¾ "
Totals	1,400	$543,481.00	12,278,157	$109,575.95	$52,672.91	$56,903.04	9½	As above.

This statement is presented as a summary to the statements and tables which precede, as it shows the number of cars operated by this company, estimated value, mileage made and money earned, repairs made, net profit and per cent. of profit on entire equipment. This includes all kinds and classes of cars, from a first-class new passenger coach down to some freight cars which were built 20 years ago, and are seldom allowed to venture beyond the precincts of some friendly side-track.

TABLE NO. 1.

Showing Average Mileage Made by Western & Atlantic Box Cars of Various Ages, Also Repairs Made, thus Giving Average Revenue, Expense and Net Loss or Profit Earned by Cars, with Per Cent. of Profit or Loss for One Year.

W. & A. BOX CARS IN GENERAL SERVICE.

Age.	Mileage.....	Money... ..	Repairs.....	Net profit...	Net loss. ...	Per cent. of profit per car....	Per cent. of Loss per car...
1 Year.....	13,149	$98.62	$9.58	$89.04	.....	17 4-5	.....
2 Years.....	13,478	101.08	38.13	62 95	.....	12 3-5	.....
3 "	10,475	78.56	48.24	30.32	.....	6	.....
4 "	9,847	73.85	45.85	28.00	.....	5 3-5	.....
5 "	9,881	74.11	57 31	16.80	.....	3⅜	.....
6 "	9,349	70 12	70.74	.....	62	.....	1-10
7 "	8,96-	67 26	60.74	6.52	.....	1⅛	.....
8 "	9.250	69.37	55.49	13.88	.....	2 3-5	.....
9 "	9,295	69.71	49.80	19.91	.....	4	.....
10 "	7,656	57.42	53.67	3.75	.....	7-10	.....
11 "	7,864	58.98	43.03	15.95	.....	3 1-5	.....
12 "	.....	.....	.....	.....	.....	.....	.....
13 "	.....	.....	.....	.....	.....	.....	.....
14 "	6,249	46 87	53.08	.....	6.21	.....	1 1-5
15 "	6,400	48,00	47.02	.98	.....	2-10	.....
16 "	7,470	56.02	82.19	.....	26.17	.....	5 1-5

You will note profit gradually decreases on car as age increases until it reaches 6th year, then owing to heavy repairs done car is greatly improved and strengthened, and makes a small profit each year, until it arrives at 10th year, after which it is again a net loss to company.

These two tables, Nos. 1 and 2, were evolved from the record of our entire equipment during the year. In arriving at these figures I did not discard old cars, which a majority of their time were in such a dilapidated condition that they spent the greater part of it on side tracks or repair tracks, but included them in with the balance. These cars, of course, greatly decreased the profits on old cars, but as we were anxious to obtain the exact per cent. of profit or loss on the entire equipment, they were included, whether they made 13,000 miles or only 500 miles per year. An investigation of this subject cannot fail to be interesting, and we will find tome valuable suggestions embodied in the tables.

Taking the value of the car as the basis, its mileage as revenue, and repairs as expense, we are astonished at the vastness of the interest involved A box car will cost $500. A road owning 1 000 cars will have a $500,000 investment A road owning 10,000 cars will expend $5,000,000 in her equipment. These cars are then "turned loose upon the country," and are expected to earn a reasonable profit on investment.

TABLE NO. 2.

Showing Average Mileage Made by Western & Atlantic Coal and Flat Cars of Various Ages, Also Average Repairs Made, thus Giving Average Revenue, Expense and Net Loss or Profit Made by Cars, with Per Cent. of Profit or Loss for One Year.

COAL AND FLAT CARS.

Age.	Mileage.....	Money.....	Repairs.... .	Net profit..	Net loss.....	Per cent. of profit per car...	Per cent. of loss per car... ....
1 Year...	6 186	$46.39	$3 90	$42.49	.....	14	.....
2 Years	5,935	44.51	13.18	31.33	.....	10⅛	.....
3 "	4,751	35 63	15.15	20 48	.....	7	.....
4 "	4,649	34.87	13.61	21.26	.....	7	.....
5 "	6,185	46 39	15.34	31.05	.....	10⅛	.....
6 "	4,795	35.96	20 79	15.17	.....	5	.....
7 "	3,563	26.72	32 17	.....	5.45	.....	1½
8 "	4,407	33.05	46.67	.....	13.62	.....	4⅝
9 "	4.453	33.40	24 38	9.02	.....	3	.....
10 "	5,742	43.07	34.31	8.76	.....	3	.....
11 "	4.805	36 04	18 66	17.38	.....	5⅝	.....
12 "	5,224	39 18	15.56	23.62	.....	7⅞	.....
13 "	5,337	40.03	42.53	.....	2.50	.....	8-10
14 "	4,936	37 02	45 67	.....	8.65	.....	2⅝
15 "	5,307	39.80	27 83	11 97	.....	4	.....
16 "	4,936	37.02	34.07	2.95	.....	9-10	.....

Coal cars were used mostly in local service, and mileage is not so large as that made by cars used in general service.

The question then is, what is the revenue and expense, and what profit to a railroad is a car? This, of course, depends upon the age and condition. You will note in Table No. 1 that for first 5 years a box car makes good mileage and will net an average of 9 per cent. on investment. But during next five years mileage decreases, repairs increase and net profit is reduced to an average of 1 3-5 per cent. profit. In first 5 years a car half pays for itself in mileage, and after that it is almost "nip and tuck" between mileage and repairs. The life of a car depends upon how long you are willing to patch it up with repairs. I believe we have cars in occasional service which were built 20 years ago, but I am of opinion that very little of the origin 1 car remains, and they have been maintained at heavy expense and frequently loss after they pass the age of 12 years. These figures prove, I think, that the present rate of ¾ cent per mile is not excessive if cars are expected to pay for themselves in mileage, and should stimulate roads to try and increase mileage returns by proper use of cars. The majority of our cars were built years ago, and I believe are more expensive to maintain than the more modern cars.

ITEMIZED REPAIR STATEMENT FOR TABLES 1 AND 2.

Showing Average Repairs Made on Cars of Various Ages, Itemizing Same and Giving Average Mileage Earned for One Year.

BOX CARS.

Age of cars. Years.	Axles.....	Bolts.....	Brasses.....	Cast iron.....	Carriage bolts.. ..	Chains.....	Labor.....	Lumber... ...	Lag screws.....	Locks.....	Meals for men on line.....	Nails....	Paint.....	Screws.....	Solder	Springs....	Tin...	Washers.....	Wrought iron... ...	Wheels.....	Total average repairs per car.....	Average mileage per car.....
1.	$0.30	$0 52	$1.18	$1.17	$0 03	$0 12	$3.87	$0.30	$0.04	.....	.....	.....	.....	.....	$0.03	$0.23	.....	.....	$1.19	$0.60	$9.58	13,149
2.	.87	2.30	11.72	2.25	.08	.20	9.34	1.31	.18	.....	.....	$0.16	$0.65	.....	.15	3.26	$0.04	.....	2.79	2.83	38.13	13,478
3.	3.87	2.24	11.72	3.45	.10	.20	8.55	1.48	.18	.....	$0.02	.15	.09	$0.01	.20	3 40	.06	.....	4.22	8.30	48.24	10,478
4.	4 58	2.15	9.44	1.95	.06	.21	7 76	1.65	.13	.....	.....	.12	.04	.02	.14	2.15	.02	.....	5.55	9.88	45.85	9,847
5.	2.92	2.24	11 89	2.64	.13	.35	12.99	5 03	.24	$0 02	.05	.32	.23	.05	.22	3.32	.03	.....	6.47	8.17	57.31	9,881
6.	8.50	1.32	10.56	3.58	.12	.21	13.02	5.01	.28	.....	.28	.44	2.12	... .	.21	2.70	.02	.....	5.60	6.85	70.74	9,349
7.	2.70	1.91	11.72	1.46	.19	.28	13.19	11.26	.33	.....	.....	.94	1.50	.04	.19	1.89	.07	.....	5.17	7.90	60.74	8,968
8.	2.50	2.13	10.60	3 05	.10	.52	15.99	7.10	.20	.....	.....	.60	1.35	.....	.26	.50	.07	.. .	4.52	6 60	55.49	9 250
9.	3.00	2.20	9 71	2.68	.12	.15	11.97	3.10	.20	.....	.....	.31	1.00	.....	.38	.90	.36	...	6.52	7.20	49.80	9,295
10.	1.80	2.46	7.01	2.59	.05	.10	14.52	6.16	.07	.....	.....	.72	1.23	.04	.14	3.15	.03	....	7.40	6.20	53.67	7.656
11.	2.37	2.08	7.57	2.91	.05	.20	12 47	3.98	.07	.03	.05	.35	.24	.05	.17	1.52	.06	.03	4.08	4.75	43.03	7,864
12.	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13.	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14.	3.60	2.25	7.95	3 49	.15	.05	14 01	6.22	.14	.....	.....	.44	1.42	.03	.30	.90	.08	.. .	4.85	7.20	53.08	6.249
15.	2.70	2.70	8.06	3.04	05	.....	14.01	4.21	.03	.....	.....	.45	.56	.10	.14	.30	.07	.....	3 90	6.70	47.02	6,400
16.	5.70	2.27	10.85	4.51	.02	.....	23.07	10.71	.07	...	..	.42	.77	.05	...	3.56	.07	. . .	7.95	12.10	82.19	7,470

COAL CARS.

1.	.....	$0.35	$0.17	$0.50	.....	$0.09	$1.79	$0.34	.....	..	.....	.....	.....	.....	.....	$0.15	.....	.....	$0.60	.....	$3.90	6.186
2.	$0.72	.64	2.60	.88	$0.04	....	2.35	.58	$0.02	.....	.....	$0.04	.....	.....	.....	1.56	...	.....	2.51	$1.15	13.18	5.935
3	.80	1.25	3.65	1.72	.04	.04	3.53	.63	.....	.....	.....	.04	.....	.....	.....	.50	...	.....	1.39	1.60	15.15	4,751
4.	1.20	1.00	3 27	1.31	.....	.05	2.51	.10	.....	.....	.....	.04	.....	.....	.....	.30	...	.....	1.43	2.40	13.61	4,649
5.	1.80	1.15	1.96	1.41	.04	.10	2.66	.32	.....	.....	.....	.04	.....	.....	.....	.40	...	.....	1.86	3.60	15 34	6.185
6.	2.40	.66	3.25	.80	.04	.10	4.66	1.16	.....	.....	.....	.04	.....	.....	.....	.60	...	.....	2.28	4.80	20.79	4,795
7.	3.40	.50	3.75	2.10	.04	.....	9.78	3.70	.....	..	.....	.10	.....	.....	.....	.....	...	.....	2.00	6.80	32 17	3,563
8.	4.00	.30	5.42	2.18	.10	.	10.31	10.30	.....	.....	.....	.15	.....	.....	.....	.75	...	.....	5.16	8.00	46 67	4,407
9.	....	1.10	3.98	1.53	.....	.15	8.14	2.46	.....	.....	.....	.10	.....	.....	.....	.....	...	.....	6.92	....	24.38	4,453
10.	.....	1 30	5.00	.....	.....	.....	14.91	7.50	.....	.....	.....	.20	.....	.....	.....	.....	...	.....	5.40	. ....	34.31	4,460
11.	.....	.73	2.92	1.36	.....	.....	7.48	1.76	.....	.....	.....	.15	.....	.....	.....	.50	...	.....	3.76	....	18.66	4,805
12.	.....	1.21	2.90	.62	.05	.....	6 92	1.46	.....	.....	.....	.08	.....	.....	.....	.22	...	.....	2.10	....	15.56	5,224
13.	2.80	.46	5.05	4.93	.....	.10	9.23	8.20	.....	.....	.....	.32	.....	.....	.....	.60	...	.....	5.24	5 60	42.53	5,337
14.	3.75	1.20	5.35	3.20	.....	.08	9.56	7.14	.....	.....	.....	.25	$0.15	.....	.....	1.87	...	.....	5.65	7.50	45.67	4,936
15.	1.33	.84	2.74	1.92	.00	.22	7.62	2.82	.02	.....	.....	.20	.....	.....	.....	.66	...	.....	5.65	3.75	27.83	5,307
16.	2.40	.45	6.45	1.21	.....	.10	11.08	3.28	.....	.....	.....	.10	.....	.....	.....	.30	...	.....	3.90	4.80	34.07	4,936

These figures were deduced from a very complete and accurate record of all repairs done on our entire equipment during the year. A separate account was kept for each car. The men in car shops were required to turn in their books each night, showing actual time and material expended on each car. These figures were then posted in our books, care being taken to debit each car with time and material disbursed, and credit them with old material. At end of year these figures were consolidated and an average struck. In calculating these averages paticular care was exercised to keep cars of same ages together.

the wire had been up a short time, the wind began to rise, but though the deflection of the wire sideways, the versed sine being 23 ft., amounted, as tested by the theodolite, to about 14 ft., the centre did not rise above its normal position of 23 ft. below the points of support, when, however, the deflection sideways was more than 14 ft. it rose very rapidly, proving, it may be presumed, that up to 14 ft. deflection the wire stretched to meet the extra strain put on it. The wire when placed in position on the railway showed no alteration, the difference between the observations of July 17 and 22 being $\frac{1}{10}$ in. By experiment on the railway 1 in. pull on the wire gave 3 in. rise at the centre and 1 in. drop of wire gave a fall at centre of 3⅝ in.

Small triangulations.—Several small triangulations were made in different places, among which may be mentioned that for checking the distance between the Fife piers, the correct length as measured by rods, was 154.994 ft., by triangulation this was 154.992 ft.

Setting out steel work.—The whole of the steel for the cantilevers being constructed at the Forth Bridge Works, it was necessary that this should be set out most accurately to agree with the setting of the piers. For setting the tubular members it was only necessary that these should be maintained in a straight line, and for this purpose at one end of the timber cradles on which the tubes were erected and drilled angle iron standards were built into brick piers, and on each standard was placed an iron plate having a 1-in. hole drilled in it at a given height, and in the centre line of the cradle; at the other end was placed a timber stage, and on this a theodolite was placed and brought to the centre line of the cradle and also to the given level; then wooden pieces were fitted at the feet so that the theodolite could at any time be put up in the same position, the theodolite was leveled and brought to bear on the hole in the plate, cross strings were put in the tube to be sighted, and the tube was moved until the cross strings coincided with the theodolite line. For the main tubes over the piers these lines must be parallel, 120 ft. between centres and the whole must be square, also the cross lines through the centres of the bed plates must be at the proper distances apart and square to the centre lines of the tubes; to secure this a centre line parallel to one tube was carefully marked down along the line of a steel standard 400 ft. long, which was put down for reference as to the proper setting out of the steel, a line was put in at each end of the drilling roads square to this, and then ou the other side a line square to these and parallel to the first, and the whole of these lines were carefully measured with the rods, the possible error being found to be ½-in. The centres of the tubes, which should have been 120 ft., were found to be, owing to the rods being long where this setting was done, 120 ft. 0⅜ in., and the distances between centres of bed-plates for which the dimension was 145.037, were proved by several independent measurement to be { 145.0468 ft. and 145.0334 ft. / 145.0504 ft. and 145.0367 ft.

The measurements for the Inch Garvie bed-plates, which were done later, were correct in both directions,

Comparison of rod measurement and that made from steel standard.—The greatest difference in 433.0334, 433.0347, and 433.0359 ft. was .0025, or $\frac{3}{32}$ in.

Use of steel rods for setting out steel work.—The author pointed out at an early stage of the work that the steel ought not to be set out with wooden standards, but with steel rods, which if made standard at a given mean temperature would produce work which, whatever the temperature at which it was set out, would have the same relative dimensions and the same absolute dimensions at the mean temperature, which would not be the case with work set out with wooden rods, which were, moreover, very often inaccurate in themselves, which inaccuracies those who used them had no means of checking.

Car Mileage and Cost of Repairs.

The accompanying tables are reproduced from an able and careful paper by Mr. E. C. Spalding, Car Accountant of the Western & Atlantic Railroad, on "The MacRae System of Car Mileage and Repairs," containing tables and statements evolved from a system originated by Gen. Wm. MacRae, late General Manager of the Western & Atlantic Railroad. They are, so far as they go, the most complete information of the kind extant as to the details of car repairs. The very way in which they were obtained, which was as follows, almost forbids an attempt of the kind on a road having a large number of cars:

All the cars on the road were classified according to age, the oldest cars having been, according to the table, 16 years old. The paper does not specify how many cars of each age were in use, but as the amount of rolling stock on the road neither increased nor decreased from 1872 to 1885 inclusive, we may infer that the ages were fairly distributed. There chanced to be no box cars 12 or 13 years old, but there were coal and flat cars of every age.

Every expenditure in the car department for "repairs of cars" which, by a letter to the *Railroad Gazette* from Mr. Spalding, in this issue, will be seen to include renewal expenses also, as is the usual custom, and as the paper itself implies clearly enough, was then distributed to the various cars, according to ages, for one entire year (1883), to do which effectually it was necessary to note the maintenance expenditure on each car separately. The totals thus obtained were divided by the number of cars and the average cost per car of each age, for some 29 different items, was thus obtained.

Even with all this trouble, it would not have been possible to obtain the desired facts, for lack of accurate mileage reports, had not the system of "daily individual car reports," which has since been in good part abandoned, been in use in the South at that time. All circumstances conspired, therefore, to facilitate obtaining results of unusual completenss and value.

One circumstance only tends to decrease the value of the results—that the records cover only a single year. If it was not a fair average year, during which the maintenance expenses were so kept up that the average condition and number of cars was neither better nor worse at the end of the year than it was at the beginning, very serious error would result, and as it would be impossible to insure this exactly, some margin of error from this cause must be allowed for; but had there been chance for any great error in this respect, those who took so much pains to get at such detailed information might be trusted to note such a fact or to avoid such a year. As an average of the past 14 years the maintenance charges must necessarily have been just enough to keep good the stock, since the number of cars has been neither increased nor decreased, and we may assume that their average condition, if in running order, is not materially different.

Table No. 1 was given in these columns Aug. 20, 1886, up to the age of 10 years, but we now reproduce the complete table for both box cars and flat cars for all ages of cars to be found on the road. Tables 3, 4 and 5 of the paper we have previously published (Oct. 22) with an accompanying letter of Mr. Spalding, and therefore omit. Table 7 we combine with Table 6. Table 8, which is very voluminous, we have abstracted. Table 10, giving the mileage balance of the Western & Atlantic Railroad, seemed of only local interest. The remainder of the tables, and also the whole paper, which consists only of the notes to the tables (except for a half page preface) we have given in full. We fear it will be a long day before we shall see equally full statistics for any larger number of cars or for any longer period, or indeed from any source.

It may be noted as an additional fact, which perhaps carries an important moral, that the total expenditure which was thus abstracted and distributed amounted to $52,673. How much extra expense was incurred to make these records we cannot say, but we question if the staff was increased by even one man; many men simply taking a little more than usual trouble. If such records were the rule instead of the exception, would there not be likely to be detected many hopeful directions for economy in comparison of the results on different roads?

TABLE NO. 6.

Average miles made, repairs made and money earned by cars various ages per car per day.

	648 Cars.		
Box Cars—Age.	Miles.	Repairs per mile, cents.	Money earned
1 Year.....	36	02¾	$27
2 Years...	37	10	28
3 Years.....	29	13	22
4 Years.....	27	12⅜	20
5 Years.....	27	15	20
6 Years.....	26	19½	19
7 Years.....	25	16⅝	19
8 Years.....	25	15	19
9 Years.....	25	13⅝	19
10 Years.....	21	14⅝	16
11 Years.....	22	12	17
12 Years.....	..	..	..
13 Years.....	..	..	..
14 Years.....	17	14¼	13
15 Years..	18	13	14
16 Years...	20	22¾	15

TABLE 8.

Abstract of car maintenance expenses on Western & Atlantic Railroad for all kinds of cars of all ages and conditions, for one year.

No. of cars.	38	194	40	489	648
Kinds of cars.	Passenger cars.	Local box cars.	Stock cars.	Coal and flat cars.	Green line box.
Items.					
Axles	$520.00	$207.00	$60.00	$394.00	$1,617.00
Brasses	1,049.55	513.87	136.31	1,647.55	5,633.40
Wheels	832.50	497.00	102.00	930.25	3,549 00
Springs	60·49	97.00	.....	334.00	1,573.51
Total running gear	$2,462.54	$1,314 87	$298 31	$3,305.80	12,372.91
Bolts	$26.10	$125.93	$27.90	$367.43	$1,147.52
Cast iron	496 87	463.99	43.06	557.32	1,611.13
Wrought iron	502.68	752.36	88.10	1,093.73	2,587.38
Nails	5.35	48.47	16.77	41.51	202.25
Lumber	86.22	662.45	151.13	1,038.33	2,294.88
Int. fittings	899.69	.....	.....	.....	.....
Paint	359 50	63.66	.....	5.05	408 80
Misc. mat'l	107.67	230.59	13.29	74.56	582.41
T'l misc. ma'l	$2,475.08	$2,347.45	$340 25	$3,178.33	$8,737.37
T'l material	$4,937.62	$3,662.32	$638.56	$6,484 13	$21,110.28
Labor	4,241.27	2,157.25	373.97	2,188.53	6,878.98
Grand total	$9,178.89	$5,819.57	$1,012 53	$8,672.66	$27,989.26
T'l mileage	1,386,268	1,508,443	224,062	2,651,466	6,507,915

A computation from this table giving the cost per car per year for the chief items above, and also per car mile, is given in our editorial columns.

The cost of passenger car repairs includes, whether by accident or otherwise, no charges for seats or upholstery.

TABLE 9.

Showing proportionate cost of keeping in repair trucks and bodies of 100 box cars for one year. Age of cars, three years. Built at cost of $515 each.

Trucks, original cost $315.		Body, original cost, $200.	
Items.	Average repairs per truck.	Items.	Average repairs per body.
Axles	$3.04	Bolts	$1.11
Bolts	.67	Cast iron	1.33
Brasses	12.44	Chains	.15
Cast iron	2.66	Labor	5.45
Labor	2.72	Lumber	1.70
Lumber	.11	Nails	.08
Nuts	.02	Nuts	.06
Paint	.02	Paints	.06
Springs	4.97	Screws	.45
Wrought iron	2.10	Solder	.27
Wheels	6.06	Springs	1.26
		Tin	.21
Totals	$34.81	Wrought iron	1.40
		Totals	$13 44

Proportion of expense, about ¾ to trucks and ¼ to body.

The Western Railroad Club.

A meeting of this Club took place on Wednesday, Dec. 15, in Chicago, the President, Mr. W. L. Scott, in the chair.

THE INTERCHANGE RULES.

Mr. G. W. RHODES (Chicago, Burlington & Quincy) suggested that some rule be adopted in the interchange rules as to the thickness of flanges of steel-tired wheels, and moved that wheels be not allowed to run with flanges less than ¾ in. thick.

Mr. VERBRYCK thought this too thin.

Mr. JOHNSTON had made flanges on steel-tired wheels of that thickness and had no breakage. The thickness on tread at last turning is ⅞ in.

Mr. VERBRYCK asked what is the safe thickness of tread of steel tires; ½ in. thick had broken on a 33-in. paper wheel.

Mr. CASANAVE thought safety depended on mode of fastening.

Mr. TOWNSEND ran steel tires with ¾ in. flange and ⅞ in. tread and thought them safer than 1 in. flauge on chilled wheels.

Mr. SCHROYER, Chicago & Northwestern, thought wheels with ¾ in. flange dangerous in going over three-throw switches. Such wheels should be pressed out so as to allow proper play between rail and wheel. With u due play when one wheel was against rail the other would strike frog point.

Mr. VERBRYCK had known steel tires break when ½ in. thick.

Mr. SCOTT thought some distinction should be made between plain steel tires and those with central web.

Mr. CASANAVE moved that the question of the proper minimum thickness of steel tires of different sections be referred to a committee.

The report of a committee on draw-bars in connection with the rules of interchange was then read. The Committee was composed of Messrs. Verbryck, Johann and Townsend. The report suggested that the figures given in Rule 9 were sufficient for common cast-iron draw-bars, and that where patent draw-bars are destroyed payment be made for common standard draw-bars. Cars with different draw-bars at each end should be accepted if of the right length and in good order.

Mr. CASANAVE asked if, under the committee's proposed rule, a car must be accepted with a different draw-bar to that originally under the car.

Mr. RHODES moved that last clause of report be not accepted, as it conflicted with rules against repairing cars with things not to original standard or of wrong material. A blue defect card met the case.

Mr. SCHROYER thought that roads that used the M. C. B. standards should not be harshly dealt with. The different lengths of draw-bars gave trouble.

Mr. JOHNSTON thought that a broken draw-bar should be replaced with one of the same pattern. The motion was carried and the report accepted as amended.

Mr. JOHNSTON: This rule would bear hardly on railroads that were trying patent draw-bars. If other roads broke them they should pay full value for them, and so spare the expense of trying a very important question.

The PRESIDENT: Many roads still persist in using draw-bars that are not serviceable, are expensive, and are breaking like pipe stems. It has ceased to be an experiment. Many of these draw-bars are utterly useless, and other roads may fairly object to help maintain this great expense.

Mr. VERBRYCK also objected to continue paying for weak draw-bars that some roads persist in using.

Mr. W. FORSYTHE agreed with the former speakers, but suggested that draw-bars recommended by M. C. B. Association be replaced when broken free of charge.

RAILROAD EARNINGS IN OCTOBER.

Name of Road.	Mileage. 1886.	1885.	Inc.	Dec.	P. c.	Earnings. 1886.	1885.	Inc.	Dec.	P. c.	Earnings per Mile. 1886.	1885.	Inc.	Dec.	P. c.
EASTERN ROADS.															
Balt. & Potomac	92	92				$ 129,640	$ 125,145	$ 4,495	$	3.6	$ 1,407	$ 1,360	$ 47	$	3.6
Buff., N.Y. & Ph	663	663				227,384	240,662		13,278	5.5	343	363		20	5.5
Buff., Ro. & Pitts	294	294				128,865	121,031	7,834		6.5	438	412	26		6 5
Camden & Atlan.	79	79				37,048	33,750	3,298		9.8	469	427	42		9.8
Danbury & Nor.	37	37				23,882	22,604	1,278		5.6	645	611	34		5.6
Grand Trunk	3,004	2,998	6		0.2	1,530,575	1,318,817	211,758		16.1	510	440	70		15.9
Lehigh & H. R.	63	63				20,607	17,019	3,588		21.1	327	270	57		21.1
Long Island	354	354				237,509	225,895	11,614		5.1	671	638	33		5.1
Maine Central	527	527				302,857	272,012	30,845		11.3	575	516	59		11,3
N. Y. C. & H. R.	1,541	993	548		55.2	3,190,361	2,245,486	944,875		42.1	2,070	2,261		191	8.5
N. Y. City & No.	54	54				50,684	45,370	5,311		11.8	939	840	99		11 8
N. Y., L. E. & W.	1,076	1,075	1		0.1	1,851,019	1,623,737	227,282		14.0	1,720	1,510	210		13.9
N. Y. & N. Eng.	392	392				381,180	339,963	41,217		12 1	912	867	105		12.1
N. Y., Ont. & W.	321	321				117,150	114,848	2,302		2.0	365	358	7		2.0
N. Y. Sus. & W.	153	150	3		2.0	109,868	105,087	4,781		4.6	718	701	17		2.5
Northern Cen.	322	322				516,825	534,011		17,186	3.2	1,605	1,658		53	3.2
Pennsylvania	2,340	2,310	30		1.3	4,737,348	4,359,171	378,177		8.6	2,025	1,887	138		7.3
Phila. & Reading	1,560	1,560				3,011,482	2,878,370	133,112		4.6	1,930	1,845	85		4.6
West Jersey	200	200				96,595	95,704	891		0.9	483	479	4		0.9
Total, 19 roads	13,072	12,484	588		4.7	16 700,876	14,718,682	1,982,194		13.4	1,278	1,178	100		8.5
SOUTHERN ROADS.															
Ala. Great So.	290	290				124,072	104,273	19,799		19.0	428	360	68		19.0
Cape F. & Y. V.	155	155				24,241	22,353	1,888		8.4	156	144	12		8.4
Cin., N. O. & T.P	336	336				285,460	257,163	28,297		11.6	850	765	85		11.6
E. Ten., V. & G.	1,100	1,100				438,950	411,380	27,570		6.7	399	374	25		6 7
Flo. Ry. & N. Co	540	540				79,598	81,218		1,620	2.0	147	150		3	2.0
Georgia Pacific	342	317	25		7.9	88,267	69,005	19,262		27.9	258	218	40		18.2
Ill. Cen., So. Div.	711	711				434,705	466,200		31,594	6.8	611	656		45	6 8
Jack., T. & K. W	204	56	148		264.3	29,213	7,352	21,861		295.4	143	131	12		9.2
Louis. & Nash.	2,022	2,022				1,383,753	1,263,469	120,284		9.5	684	625	59		9.5
Louis. N. O. & T.	533	533				197,372	163,201	34.171		20.9	370	306	64		20.9
Mem. & Charles.	292	292				160,908	133,794	27,114		20.2	551	458	93		20.2
Miss. & Tenn.	100	100				59,963	45,812	14,151		30 8	600	458	142		30.8
Mobile & Ohio.	680	680				212,075	253,956		41,881	16.5	312	373		62	16.5
N., Chat. & St. L	580	580				213,200	191.846	21,354		11.1	368	331	37		11.1
N. O. & North E.	195	195				74,462	77,897		3,435	4.3	382	399		17	4.3
N.N.& M. Vy.Co.:															
Ches. & Ohio.	502	502				372,031	307.436	64.595		21.0	741	612	129		21.0
E., Lex. & B. S.	130	130				90,674	70.932	19,742		28.0	698	546	152		28.0
C. Ohio & S. W.	399	399				181,436	163,106	18,330		11.2	454	409	45		11 2
Norfolk & West.	510	510				334,712	285,981	48,731		17.0	656	561	95		17.0
Rich. & Danville:															
R. & Dan. Div.	960	960				435,144	425,516	9,628		2.3	453	443	10		2.3
Va. Midland D	355	355				155,124	152,939	2,185		1.4	437	431	6		1.4
W. N. C. Div.	290	290				52,569	46,771	5,798		12.3	181	161	20		12.3
So. Car. Div.	373	373				87,421	95,477		8,056	8.5	234	256		22	8.5
Gr. & Col. Div.	296	296				67,902	88,737		20,835	23.4	229	260		70	23.4
Shenandoah Val.	255	255				81,854	66,288	15,686		23.8	321	260	61		23.8
South Carolina.	246	246				134,807	134.960		153	0.1	548	549		1	0.1
Vicks. & Merid'n	143	143				54,047	48,061	5,986		12.3	378	336	42		12.3
Total, 27 roads	12.539	12,366	173		1.4	5,854.060	5,435,202	418,858		7 7	467	439	28		6.3
CENTRAL GROUP.															
Cairo, V. & Chi.	265	265				60,962	44,583	16,319		36.3	230	168	62		36.3
Chi. & Atlantic	269	269				167,075	124,341	42,734		34.2	625	462	163		34.2
Chi. & East. Ill.	252	252				173,996	175 661		1,965	1.1	690	698		8	1.1
Chi. & W. Mich.	413	413				124,543	125,360		817	0.6	301	303		2	0.6
Cin., Ham. & D.	354	354				273,304	249,351	23,953		9.6	772	704	68		9 6
C., I., St. L. & C.	342	342				250,778	220,266	30,512		13.9	733	644	89		13.9
Cin., Jack. & M.	98	91	7		7.7	16,419	12,647	3,772		29.9	168	139	29		20.7
C., Wash. & Balt.	281	281				191,579	150,693	40,886		27.0	682	536	146		27.0
Clev., Ak. & Col.	144	144				49,147	47,291	1,856		3.9	341	328	13		3.9
Cleve. & Canton.	161	161				33,816	27,119	6,697		25.5	210	168	42		25.5
Cl., Col., Cin. & In.	391	391				379,784	357,003	22,781		6.4	971	913	58		6.4
Col. & Cin. Mid.	71	71				29,519	21,754	7,765		35.1	416	305	111		35.1
Col., H. V. & T.	328	324	4		1.2	257,190	246,713	10,477		4 2	784	761	23		3.0
Det., Lan. & No.	261	261				112,734	137,214		24,480	18.0	432	526		94	18.0
Ev. & T. Haute.	146	146				64,827	66,905		2,078	3.1	444	458		14	3.1
Flint & Pere M.	362	362				185,607	180,860	4,747		2.6	513	500	13		2 6
G. R. & Ind.	404	404				200,740	198,252	2,488		1.2	497	491	6		1.2
Ill. Cen., Ill. lines	953	953				639,782	646,420		6,638	1.0	671	678		7	1.0
Ind., Bl. & West.	532	532				245,346	227,115	18,231		8.1	461	417	54		8 1
Ind., Dec. & Sp.	152	152				41,266	34,182	7,084		20.8	271	225	46		20.8
Lake Erie & W.	387	387				116,379	103,590	12,789		12.2	301	268	33		12.2
L., Ev. & St. L.	253	253				84,668	68,758	15,910		23.1	335	272	63		23.1
L., N. A. & Chi.	477	477				187,636	176,281	11,355		6.5	393	370	23		6.5
Mich. & Ohio.	156	156				22,698	20,297	2,401		11.9	146	131	15		11.9
N. Y., Penn. & O.	587	587				564,471	524,860	39,602		7.5	962	894	68		7.5
Ohio & Mississip.	615	615				382,337	374,003	8,334		2.2	622	608	14		2.2
Ohio Southern	130	130				54,993	52,130	2,863		5.5	423	401	22		5.5
Peoria, Dec. & Ev.	254	254				77,176	67,021	10,155		15.1	304	264	40		15.1
St. L., Al. & T. H.:															
Main line	195	195				128,659	131,564		2,905	2.2	660	675		15	2.2
Belleville line	138	138				88,838	86,377	2,461		2.8	644	626	18		2.8
T., A. A. & N. M.	100	100				33,949	28,603	5,346		18.7	339	286	53		18.7
Tol. & O. Cen.	213	213				83,525	67,572	15,953		23.5	392	317	75		23.5
Valley, of Ohio.	82	82				57,721	47,513	10,208		21.5	704	580	124		21.5
Wab., St. L. & P.	2,140	2,140				1,254,537	1,206,347	48,190		4.0	586	564	22		4.0
Total, 34 roads	11,906	11,895	11		0.1	6,635,941	6,248,955	386.986		6.2	557	525	32		6 1
NORTHWESTERN ROADS.															
Bur. Ced R. & No.	990	990				316,204	349,503		33,299	9.5	319	353		34	9.5
Central Iowa.	521	500	21		4.2	132,968	147.943		14,975	10.1	255	296		41	14.1
Chi. & Alton.	850	850				792,563	767.047	25,516		3.3	932	902	30		3.3
Chi. Bur. & Q.	3,700	3,480	220		6.3	2,776,774	2,858,258		81,484	2 9	750	821		71	8.9
Chi., Mil. & St. P.	5,100	4,935	165		3.3	2,709,000	2,892,474		93,474	3.2	549	586		37	6.3
Chi. & Northw.	4,055	3,843	212		5.8	2,766,800	2,878,468		111,668	3.9	682	753		71	9.5
C., St. P., M. & O.	1,343	1,320	23		1.7	650,700	699,884		49,184	7.0	485	530		45	8.5
Des M. & Ft. D.	143	143				35,538	42.025		6,487	15.1	249	294		45	15.1
Ill. Cen., Ia. lines	402	402				184,324	178,768	5,556		3.1	459	445	14		3.1
Minn. & St. L.	160	160				110.096	106.558	3,538		3.3	688	666	22		3.3
Mil., L. S. & W.	533	520	13		2.5	251,552	160.284	91,268		57.0	472	308	164		53.2
Mil. & Northern.	227	227				62,454	54.367	8,087		15.3	275	239	36		15.3
Minn. & Northw.	109	109				49,180	25,751	23,429		90 8	451	236	215		90.8
Wisconsin Cen.	450	450				144,430	142,192	2,238		1.6	321	316	5		1.6
Mo., St. C. & W.	107	107				31,820	17.536	14,284		82 8	297	164	133		82.8
Wis. & Minn.	176	54	122		225.9	47,955	16,045	31,910		199.0	273	297		24	8 1
Total, 16 roads	18,866	18,090	776		4.3	11,152.358	11,337,103		184.745	1.6	591	627		36	5.8
ROADS NORTHWEST OF ST. PAUL.															
Canadian Pac.	4,300	3,500	800		22.9	1,077.630	915 838	161,792		17.7	251	262		11	4.2
Northern Pac.	2,800	2,691	109		4.0	1,443,667	1,522,285		78,618	5.2	516	566		50	8.8
St. P. & Duluth.	225	225				200,177	177,666	22,511		12.6	890	790	100		12.6
St. P., Minn. & M	1,600	1,485	115		7.7	945,998	1,004,789		58,791	5.8	591	677		86	12.8
Total, 4 roads.	8,925	7,901	1,024		13.0	3,667,472	3,620.578	46,894		1.3	411	458		47	10.3
SOUTHWESTERN ROADS.															
Fort W. & Den.	144	144				55,499	43,793	11,706		26.6	385	304	81		26.6
G., C. & S. Fe.	692	590	102		17.3	261,694	304,773		43,079	14.1	378	517		139	27.7
H. & Tex. Cent.	521	521				378,265	446.573		68,308	15.2	726	857		131	15.3
K. C., Ft. S. & G.	389	389				231,675	260,564		28,889	11.1	596	670		74	11.1
K. C., S. & Mem.	282	282				154,188	127,316	26,872		21.2	547	451	96		21.2
St. L., Ark. & Tex	735	735				183,499	163,259	20.240		12.4	250	222	28		12.4
St. L., Ft. S. & W.	274	215	59		27.5	101,963	69,765	32,198		46.0	372	324	48		14.9
St. L. & San F.	870	814	56		6.7	533,527	477,864	55,663		11.7	613	587	26		4.4
V., Shreve. & Pa.	170	170				68,193	58,499	9,694		16.6	401	344	57		16.6
Total, 9 roads.	4 077	3.860	217		5.6	1,968,503	1,952,406	16.097		0.8	483	506		23	4.6
FAR WESTERN AND PACIFIC ROADS.															
A., T. & S. Fe.	2,418	2,397	21		0.9	1,687.348	1,676,075	11,273		0.7	698	699		1	0.1
Den. & Rio G.	1,317	1,317				713,206	626,363	86,843		13.9	542	476	66		13.9
Den. & Rio G. W.	368	368				104 400	126,883		22,483	17.7	284	345		61	17.7
St. J. & G. Isl'd.	252	252				121,957	125,962		4,005	3.2	484	500		16	3.2
Texas & Pacific.	1,487	1,487				612,790	692,187		79,397	11.5	412	465		53	11.5
Union Pacific.	4,531	4,427	104		2.4	2,755,154	2,714,698	40,546		1.5	608	613		5	0.8
Total, 6 roads.	10,373	10,248	125		1.2	5,994,855	5,962,078	32,777		0.5	578	582		4	0.7
GRAND TOTAL: Total, 115 roads	79,758	76,844	2,914		3.8	51 974,065	49,275,004	2,699,061		5.6	652	641	11		1.7

RAILROAD EARNINGS, TEN MONTHS TO OCTOBER 31.

NAME OF ROAD.	MILEAGE.					EARNINGS.					EARNINGS PER MILE.				
	1886.	1885.	Inc.	Dec	P. c.	1886.	1885.	Increase.	Decrease.	P. c.	1886.	1885.	Inc.	Dec.	P. c.
EASTERN ROADS.															
Balt. & Potomac.	92	92				$ 1,108,842	$ 1,099,415	$ 9,427		0.9	$ 12,053	$ 11,950	$ 103		0.9
Buf., N. Y. & P..	663	663				2,170,744	1,998,670	172,074		8.6	3,274	3,017	257		8.6
Buf., Roch. & P.	294	294				1,006,491	1,025,768		19,277	1.9	3,423	3,489		66	1.9
Camden & Atlan.	79	79				537,684	502,614	35,070		7.0	6,806	6,362	444		7.0
Danbury & Nor..	37	37				200,181	190,864	9,317		4.9	5,410	5,158	252		4.9
Grand Trunk....	3,000	2,987	13		0.4	13,961,515	12,349,815	1,611,700		13.0	4,654	4,135	519		12.6
Lehigh & H. R..	63	63				177,286	145,772	31,514		21.6	2,814	2,314	500		21.6
Long Island....	354	354				2,590,704	2,465,112	125,592		5.1	7,318	6,964	354		5.1
Maine Central ...	527	527				2,583,978	2,412,448	171,530		7.1	4,903	4,578	325		7.1
N. Y. C. & H. R.	1,541	993	548		55.2	26,820,120	19,864,759	6,955,361		35.0	17,404	20,005		2,601	13.0
N. Y. City & N..	54	54				458,222	374,193	84,029		22.5	8,486	6,930	1,556		22.5
N. Y., L. E. & W.	1,076	1,075	1		0.1	15,461,201	12,968,795	2,492,406		19.2	14,369	12,064	2,305		19.2
N. Y. & N. Eng..	392	392				3,289,109	2,828,704	460,405		16.4	8,391	7,216	1,175		16.4
N. Y., Ont. & W.	321	321				1,108,439	1,048,085	60,354		5.7	3,453	3,265	188		5.7
N. Y., Sus. & W.	153	150	3		2.0	909,160	908,606	554		0.1	5,942	6,057		115	1.9
Northern Cen. .	322	322				4,523,658	4,499,629	24,029		0.5	14,049	13,974	75		0.5
Penn. R. R.....	2,331	2,272	59		2.6	41,603,635	37,596,806	4,006,829		10.6	17,848	16,548	1,300		7 8
Phila. & Read...	1,560	1,560				24,933,350	23,971,559	961,791		4.0	15,983	15,368	615		4.0
West Jersey.....	200	200				1,173,735	1,113,765	59,970		5.4	5,869	5,569	300		5.4
Total, 19 roads.	13,059	12,435	624		5.0	144,618,054	127,365,379	17,252,675		13.5	11,074	10,242	832		8.2
SOUTHERN ROADS.															
Ala. Gt. South..	290	290				953,794	861,850	91,944		10.6	3,289	2,973	316		10.6
Cape F. & Y. V..	155	155				184,486	171,334	13,152		7.7	1,190	1,105	85		7.7
Cin , N. O. & T. P	336	336				2,319,733	2,167,161	152,572		7.0	6,904	6,458	446		7.0
E. T., Va. & Ga..	1,100	1,100				3,382,232	3,310,349	71,883		2.2	3,075	3,009	64		2 2
Georgia Pacific..	342	317	25		7.9	651,984	522,043	129,921		24.9	1,906	1,647	259		15.7
Ill. Cen., S. Div.	711	711				3,057,283	3,396,606		339,323	10.0	4 300	4,777		477	10.0
Jac.. Ta. & K.W.	204	56	148		264.3	206,546	85,868	120,678		140.3	1,012	1,533		521	34.1
Louis. & Nash...	2,022	2,042		20	0.9	11,432,154	11,380,124	52,030		0.5	5,654	5,573	81		1.4
Louis., N. O. & T	533	502	31		6 0	1,289,905	934,546	355,359		38.0	2,420	1,862	558		30.0
Mem. & Charles.	292	292				1,091,432	1,029,953	61,479		6.0	3,738	3,527	211		6.0
Miss. & Tenn....	100	100				323 351	359,067		35,716	9.9	3,233	3,590		357	9.9
Mobile & Ohio ..	588	588				1 509,563	1,640.289		130,726	8.0	2,567	2,790		223	8.0
Nash., C. & St. L	580	580				1,957,056	1,759,712	197,344		11.5	3,374	3,034	340		11.5
N. Or. & N. E....	195	195				493.607	539,403		42,796	7.9	2,547	2,766		219	7.9
N. N. & M.V. Co.:															
Ches. & Ohio..	502	502				3,397,316	2,762,359	634,957		23.0	6,767	5,503	1,264		23.0
Eliz., I. & B. S.	130	130				766,825	580,441	186,384		32.1	5.899	4,465	1,434		32.1
C., O. & S. W..	399	399				1.367.467	1,272,023	95.444		7.5	3,427	3,188	239		7.5
Nor. & West.....	510	510				2.647,012	2,251,056	395,956		18.0	5,190	4,414	776		18.0
Rich. & Danville:															
Rich. & D. Div.	960	960				3.308.456	3,249.461	58,995		1.8	3,446	3,385	61		1.8
Vir. Mid. Div..	355	355				1,289,653	1,294,129		4,476	0.3	3,633	3,645		12	0.3
West. N.C. Div.	290	277	13		4.7	440.993	392.017	48,976		12.5	1,521	1,415	106		7.6
So. Car. Div. ..	373	373				623,615	656,892		33,277	5 1	1.672	1,761		89	5.1
Green. & C. Div	296	296				481,017	542,898		61,881	11.4	1,625	1,834		209	11.4
Shen. Valley....	255	255				615.287	579,014	36,273		6.3	2,413	2,271	142		6.3
So. Carolina. ...	246	246				909,029	916,212		7,183	0.8	3,695	3,724		29	0.8
Vick.& Meridian.	143	143				397,504	347,287	50,217		14.5	2,780	2,429	351		14.5
Total, 26 roads.	11,907	11,710	197		1.7	45,100,280	43,002,094	2,098,186		4.9	3,788	3,672	116		3.2
CENTRAL GROUP.															
Chicago & Adan.	269	269				1,320,030	1,101,250	218,780		19.9	4,907	4,094	813		19.9
Chi. & East. Ill..	252	252				1,434,153	1,348,866	85,287		6.3	5,691	5,353	338		6.3
Chi. & West. M..	413	413				1,155,073	1,071,503	83,570		7.8	2,797	2,594	203		7.8
C., I., St. L. & Ch	342	342				2,151,734	1,973,083	178,651		9.0	6,292	5,770	522		9.0
Cin., Jac. & Mac.	98	91	7		7.7	149,425	106,183	43,240		40.8	1,525	1,167	358		30.6
C., Wash. & Balt.	281	281				1,641,298	1,395,508	245,790		17.5	5,841	4,966	875		17.5
Cleve., Ak. & Col	144	144				443,891	419,922	23,969		5.6	3,083	2,916	167		5.6
Clev. & Canton..	161	161				296,253	242.316	53,937		22.2	1,840	1,505	335		22.2
Cl., Co.Cin.& In.	391	391				3,398,636	2,989,274	409,362		13.7	8,692	7,645	1,047		13.7
Col. & Cin. Mid..	71	71				262,352	164,191	98,161		59.7	3,695	2,312	1,383		59.7
Col., H. V. & Tol	328	324	4		1.2	1,959,114	1,953,981	5,133		0.3	5,973	6,031		58	0.9
Det., Lans. & No	261	261				1,011.292	1,023.147		11,855	1.1	3,875	3,920		45	1.1
Ev. & Terre H...	146	146				628,609	605.578	23,031		3.8	4.315	4,148	167		3 8
Flint & Pere Mar	362	362				1,783,229	1,591.501	191,728		12.1	4,926	4,396	530		12.1
Grand Rap. & In.	404	404				1,681,707	1,604,095	77,612		4.8	4,163	3,970	193		4.8
Ill. Cent., Ill. lines	953	953				5,459,611	5,350,472	109,139		2.0	5,729	5,614	115		2.0
Ind., Bloom. & W	532	532				2,105,469	1,941,264	164,205		8.4	3,958	3,649	309		8.4
Ind., D. & Spring	152	152				348,193	297,696	50,497		16 9	2,291	1,959	332		16.9
Lake Erie & W..	387	387				1,063,643	981.579	82,064		8.4	2,748	2,536	212		8.4
Louis., E. & St. L	253	253				713.361	585,210	128,151		21.9	2,820	2,313	507		21.9
L., N. A. & Chi..	477	477				1,533,560	1,369.189	164,371		12.0	3,215	2,867	348		12.0
Mich. & Ohio ...	156	156				182,791	151,166	31,625		20.9	1,172	962	203		20.9
N. Y., Pa. & Ohio	587	587				5,158,301	4,124,772	1,033,529		25.1	8,788	7,027	1,761		25.1
Ohio & Miss.....	615	615				3,219,850	3,073,150	146,700		4.7	5,236	4,995	241		4.7
Ohio Southern..	130	130				415,937	377,076	38,861		10.3	3,192	2,901	291		10.3
Peoria, D. & E...	254	254				668,475	609,484	58,991		9.7	2,632	2,399	233		9.7
St L., Al. & T. H:															
Main line.....	195	195				1,036,054	1,041,900		5.846	0.6	5,313	5,343		30	0.6
Belleville line..	138	138				615,924	624,297		8,373	1.3	4,463	4,524		61	1.3
Wab., St. L. & P.	2,204	2,204				10,575,954	9,717,187	858,767		8.8	4,799	4,409	370		8.8
Total, 29 roads	10,956	10,945	11		0.1	52,413,917	47,834,840	4,579,077		9.6	4,784	4,370	414		9.5
NORTHWESTERN ROADS.															
Bur., C.Rap. & N.	990	990				2,335,860	2,513,599		177,739	7.1	2,359	2,539		180	7.1
Central Iowa....	521	500	21		4.2	1,065,671	1,055,935	9,736		0 9	2,045	2,112		67	3 2
Chi. & Alton ...	850	850				6,541,432	6,556,206		14,774	0.2	7,690	7,703		14	0.2
Chi., Bur. & Qui.	3,669	3,470	199		5.7	22,103,637	21,908,397	195,240		0.9	6,024	6.314		290	4.7
Chi., Mil. & St. P.	4,952	4,837	115		2 4	20,000,876	19 438,597	562,279		2.9	4,039	4,019	20		0.5
Chi. & No. West.	3,998	3,837	161		4 2	20.767.518	20,070,120	697,398		3.5	5,194	5,231		37	0.7
Ch., St.P., M.& O.	1,341	1,320	21		1.6	4,9 3.105	4,760,412	192,693		4 0	3,694	3,606	88		2.3
Des M. & Ft. Do.	143	143				274,796	309,115		34,319	11 1	1,922	2,162		240	11.1
Ill. Cen., Ia. lines	402	402				1.421,452	1,350,236	71,116		5.3	3,536	3,359	177		5.3
Marq., H. & O....	160	153	7		4.6	884,288	747,310	136,978		18.3	5,527	4,884	643		13.1
Mil., Lake S. & W	533	502	31		6.1	1,942,255	1,125.035	817,320		72.7	3,644	2,251	1,393		62 9
Mil. & Northern.	227	227				522,182	464.120	58,062		12.5	2.300	2,041	259		12.5
Wisconsin Cent.	450	450				1.242,322	1,207,323	34,999		2.9	2,761	2,683	78		2.9
M., St. C. & W.	107	107				225.193	140,512	84,681		60.1	2,105	1.313	792		60.1
Wis. & Minn...	100	54	46		85.2	243,453	124,656	118,797		95.3	2,435	2,308	127		5.5
Total, 15 roads	18,443	17,842	601		3.4	84,524,040	81,771,573	2,752,467		3.4	4,583	4,583			
ROADS NORTHWEST OF ST. PAUL.															
Canadian Pacific	3,732	3.080	652		21.1	8,114,416	6,823,217	1,291,199		18.9	2,174	2,215		41	1.8
Northern Pacific	2,768	2,544	224		8.9	10,129,981	9,324,970	805,011		8.6	3,660	3,666		6	0.2
St. P. & Duluth.	225	225				1.249,559	1,094,816	154,743		14.1	5,554	4,866	688		14.1
St.P., Min. & Man	1,501	1,477	24		1.6	5.901,092	5,974,681		73,589	1.2	3,931	4,045		114	2.8
Total, 4 roads..	8,226	7,326	900		12.3	25,395,048	23,217,684	2,177,364		9.4	3,087	3,169		82	2.6
SOUTHWESTERN ROADS.															
Ft. W. & Denv..	144	131	13		9.9	340,394	386,752		46,358	12.0	2,364	2,952		588	19.9
Gulf, Col. & S. F.	656	541	115		21.5	1,760,708	1,405,633	355,075		25.3	2,684	2,508	86		3.3
Hous. & T. Cent	521	521				2.311.074	1,985,266	325,808		16.4	4,436	3,810	626		16.4
K. C., Ft. S. & G.	389	389				2,038,788	2,116,100		77,312	3.6	5,241	5,540		199	3.6
Kan. C., Spr. & M.	282	282				1.232.057	1,256,255		24,198	1.9	4.369	4,455		86	1.9
St. L., A. & Tex.	735	735				1,365,347	949.419	415.928		43.8	1,858	1.292	566		43.8
St. L. & San Fran	860	814	46		5.6	3,915,260	3,544.040	371,220		10.5	4,553	4,354	199		4 6
Vicks., Sh. & Pac	170	170				380,163	317,596	62,567		19.7	2,236	1,868	368		19.7
Total, 8 roads.	3,757	3,583	174		4.8	13,343,791	11,961,061	1,382,730		11.6	3,552	3 338	214		6.4
FAR WESTERN AND PACIFIC ROADS.															
At., Top. & S. F.	2,417	2,381	36		-1.5	12.740.023	12,714,609	25,414		0.2	5,271	5,340		69	1.3
Denver & R. G..	1,317	1,317				5,463,902	5,041,892	422,010		8.4	4,149	3,828	321		8.4
Denv. & R. G. W.	368	368				851,663	842.379	9,284		1 1	2,314	2.289	25		1.1
St. Jo. & Gr. Isl'd	252	252				961,698	907,399	54.209		6.0	3,816	3,601	215		6.0
Tex. & Pacific...	1,487	1,487				4,569.041	4,260,785	308,256		7.2	3,073	2,865	208		7.2
Union Pacific ...	4,526	4,484	42		0.9	21,908,823	20,989,351	919,472		4.4	4,846	4,681	165		3.5
Total, 6 roads.	10,367	10,289	78		0.8	46.495.063	44,756,415	1.738,645		3.9	4,485	4,350	135		3.1
GRAND TOTAL: Total, 107 roads.	76,715	74,130	2,585		3.5	411,890,190	379,909,046	31,981,144		8.4	5,369	5,125	244		4.8

The PRESIDENT: If certain roads would give notice of six months' experimental use of draw-bars, other roads would soon have some experience in interchange and would not object to six months' or even one year's experiment, but did object to a pipe-stem draw-bar, the defects of which were ascertained in a few months and yet had been continued for three or four years.

Mr. JOHNSTON agreed and considered that draw-bar be not regarded as an experiment, but be replaced by common cast-iron draw-bar. One year was a fair time for an experiment, but after that no one should be called on to help maintain a broken draw-bar.

Mr. RHODES was experimenting with certain draw-bars and wished neighboring lines to give every information as to breakage and not to replace them with their own draw-bars.

Mr. SCHROYER asked what could be done where draw-bars were furnished free by patentees.

Mr. CASANAVE thought it ought to be defined what draw-bars are experimental. Motion as amended carried.

Mr. VERBRYCK then opened a discussion of rules 9, 10 and 11. He had adopted M. C. B. standard wheel tread for both steel tired and chilled wheels, and made wheels to 4 ft. 7⅛ in., while the Pennsylvania used 4 ft. 8¼ in. He therefore thought that loose wheels should be refitted to standard of road owning cars. Corporations, such as Standard Oil Co., owning cars, should be allowed representative members in the M. C. B. Association.

Mr. RHODES thought that when a company slides a wheel it ought to pay for the new wheel rendered necessary on the other end of the same axle.

Mr. SWANSON did not use a defect card for wheels.

Mr. VERBRYCK: Cars at Council Bluffs, where we have joint inspectors, are received with defect cards for wheels.

Mr. SNOW: A car is not safe with a flat wheel and a heavy load.

Mr. JOHNSON: If the Chicago, Burlington & Quincy receive a Hannibal & St. Joseph car from the Fort Wayne with defect card, and replaces with two new wheels and one second-hand axle, end charges for two new wheels less one second-hand and one scrap, who is to pay for the wheel not slid?

Mr. RHODES thought the Fort Wayne having done the damage should pay the whole cost.

The PRESIDENT considered that if the slid wheel was originally slightly defective, the Hanibal & St. Joseph should pay for the betterment.

Mr. SNOW (Illinois Central) never heard of one slid wheel on an axle. The two wheels would always slide together.

Mr. SCHROYER moved that rule to be amended as follows: "When a company damages a car and gives defect card, the company making betterments will be governed by rule 12. Carried. Rule 10 was then adopted as worded.

Mr. LEWIS asked for a definition of fair usage in rule 11.

Mr. SNOW thought that any wearing out of brasses, shoes or any failure not due to defect or unfair usage, such as collision, was fair usage. Rule 11 was adopted as worded.

BEST FORM OF PACKING FOR PISTON RODS AND VALVE STEMS.

Mr. JOHNSON read a statement on this subject. The Chicago, Burlington & Quincy had adopted Jerome metallic packing, slightly modified, to give more play. The average mileage of rings on engines was about 50,000, the rods being skinned down $\frac{3}{64}$-in. A 3-in. piston rod would wear down to 2½ in. diameter, giving 1,000,000 miles life, or 32 years. No piston rod had been removed or taken in for leaking. Valve stems wore more rapidly and wore unevenly. About 25,000 miles and $\frac{3}{32}$ in. to $\frac{1}{64}$ in. to true up. With hemp packing the life of a piston rod was not over four years and valve stems two years. At one shop with 120 engines, one lathe was always on piston rods and two on valve stems. With metallic packing one lathe now did all the work, including all new work and breakages. One set of rings cost 36 cents for one engine. The rings on freight engines wanted renewing every three months, and on switching engines with driver brake every month. The driver brake saves a good deal of wear.

Mr. CASANAVE: The Pittsburgh, Ft. Wayne & Chicago has found hemp packing cost 13.9 cents per 1,000 miles, while turning the rods and all labor cost 9.8 cents, making total cost 23.2 cents.

Mr. JOHNSON found little wear except to metallic rings. Bushes wanted replacing only when engine came in for general repairs every 18 months or 2 years. One man did all the turning and another all replacing rings. The total cost of an entire set for one engine was about $23.

Mr. ANGUS SINCLAIR had used metallic packing with good results; it lasted well and saved delay. Considered hemp the most expensive packing. Metallic packing should allow for rise and fall of cross-head.

Mr. CASANAVE had known metallic packing cost 19 cents per 1,000 miles. It adjusted automatically to wear of rod.

Mr. C. E. SMART (Michigan Central) had only eight engines with metallic packing. On a passenger engine 1,000 miles had been run with wear of 0.01 inch on under side of rod. No rings were replaced. Metallic packing should be automatic in taking up wear, for if screwed up too tight it is soon ruined.

Mr. SINCLAIR: Metallic packing should only be applied to rods that are turned true. Neglect of this was a frequent cause of failure.

Mr. RHODES said metallic packing did not do well on the Chicago, Burlington & Quincy unless the stems are properly lubricated with a swab. Mr. Smart agreed that the greater wear on switch and freight engines was due to sucking ashes into cylinder when reversing.

Mr. JOHNSON on his division did not use a swab at all, but an automatic oil cup as on guide bars placed outside gland and feeding directly on rod.

Mr. RHODES stated that on the Iowa Division they preferred swabs kept well lubricated.

WEAR OF TIRES.

Mr. SMART, Michigan Central, then read a paper on this subject urging that the thick tires wore badly owing to the increased weight and rigidity of the wheels. The centres now weighed 2,750 pounds and the tire 1,100, making a total of 3,850 pounds per wheel. An increase is not necessary for either strength or durabilty. It would be better to put increased weight in boiler and other parts carried by the springs.

Resolutions of condolence with the families of the late Leander Garey and the late Wm. Woodcock were then passed. The Secretary read a communication from Mr. J. D. McIlwaine, of the Grand Trunk, on the proposed Central Railroad Club at Buffalo and Detroit. Particulars have already appeared in the *Railroad Gazette*.

At the next meeting, Rules of Interchange Nos. 12 and 13 will be discussed, and Mr. SMART will open a debate on Wheel Centres and the Section of Tires. The meeting then adjourned.

Railroad Young Men's Christian Association.

The Association at Columbus, O., reports for November a total attendance of 2,004 at the rooms. Of these 401 were present at the religious services. The library and reading room are in good condition and are liberally used. Thanksgiving Day was celebrated by a lunch and reception which passed off very pleasantly.

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

ADVANTAGES OF INTERLOCKED SIGNALS.

We have often called attention in these columns to the great gain in safety obtained by the use of a proper system of signals, interlocked with the switches, and so placed as to be clearly visible to an advancing train when it is still at some distance from the point of danger. The most elementary signals complying with these conditions would have effectually prevented the Rio disaster, and innumerable other accidents which have happened to trains when being run into a siding, or which have been thrown off the road by a misplaced switch of which the engineer of the advancing train had no sufficient warning. But while good, plain semaphore signals, placed where they can be clearly seen in all weathers, are a great safeguard, it must not be forgotten that they are also a great convenience on a crowded line, and enable fast trains to be run through yards and over crossings at undiminished speed, instead of constantly slackening speed at every approach to a possible obstacle.

Under the present system, or rather want of system, as regards signals, an engineer of a fast train cannot run through a yard with any confidence. He must run slowly, as he may have to stop at any moment. He sees several engines ahead, apparently switching on the side tracks, but he has no positive knowledge whether they are on the main track or not, and if not, whether they are likely to foul or cross the main track by the time he arrives at the danger point. And even if all engines and cars keep clear of his track, he has no means of knowing positively whether the switches are all set right. It is therefore absolutely necessary to slacken speed, so that the train can be stopped in the few yards that intervene between the obstacle and the point at which it is discovered.

Where proper semaphore signals are in use, interlocked with the switches, the engineer of an approaching train knows that the lowered arm of the distant signal on a high post, clearly visible 1,500 ft. away, means that every switch interfering with his track is set right, and cannot be moved until he has passed it.

On the other hand, the men switching have to ask permission before they can foul the main track, and as conflicting signals and switches are impossible, the trains switching can neither foul one another, or the through fast train on the main line.

The running of fast passenger trains is now exciting a considerable amount of attention, and through passenger trains now run regularly at speeds which a few years ago were only attained by special trains of one or two cars, for which the road was specially kept clear. When, however, it is attempted to run trains at 40 miles per hour, including stops, it is often found impossible to keep time if the "slacks" and stoppages are numerous. No matter what locomotive be used, the laws of nature will assert their sway, and the time lost in frequently slackening and then accelerating the speed of the train cannot be recovered by the best locomotive running.

This can be easily illustrated by an example. On one of our great main lines a certain division is 140 miles long, and is practically level. The fastest passenger trains are timed to do the distance in 3 hours 28 minutes; but though engines of various types and designs and belonging to different companies have been tried, the result is that once in twelve trips only is the train run on time, although the average load is only 5.5 cars. The regular station stops are seven in number. An average speed of 50 miles per hour when fairly under way is probably about correct, taking the average on slightly undulating gradients, and at each stop, probably about three miles are run in diminishing and getting up speed again. The work to be done by the engine, irrespective of friction and train resistance, in moving a train from rest to a speed of 50 miles per hour is equal to lifting the whole weight of the engine and train 88.75 ft. vertically, and consequently, if this be done in somewhat less than three miles, the extra work is nearly equal to the effect of a grade of 30 ft. to the mile and three miles long, for each stoppage. The average speed while the brakes are on, and while the train is gathering headway, may be taken at 30 miles per hour. With these assumptions, the time taken to run the division in question should be as follows:

	H.	M.
Gaining speed and applying brakes, 24 miles at 30 m. p. h..		48
Running under full headway 116 miles at 50 m. p. h.....	2	19
7 stops at 3 min. each.....		21
Total time.....	3	28

There seems nothing very unusual or severe in our assumption, but unfortunately, as we have before stated, no engine seems able to run the division in the schedule time, 3 hours 28 minutes. The reason is probably to be found, not in the locomotive, but in the time lost by crossings and slackened speed through yards. There are four railroad crossings, two of which are near together and close to a stopping station, while one is in the middle of a long yard. Making the same assumptions as to speed, etc., the time then stands as under:

	H.	M.
Gaining speed and applying brakes, 27 miles at 30 m. p. h.		54
Yard and crossings, 2 miles at 15 m. p. h.....		8
Two crossing near station, 1 mile at 15 m. p. h..		4
110 miles at 50 m. p. h.....	2	12
7 stops at 3 min. each.....		21
Total time.....	3	39

This is the actual average time taken, and therefore our assumptions as to speed, and the time taken to get up and reduce speed, are probably nearly correct.

The loss of a few minutes on a division may not appear a great matter, but a loss of 10 minutes on each of nine divisions between New York and Chicago will mean 1 hour 30 minutes, and the train that is that much slower than its rivals will carry fewer passengers in consequence.

We have shown approximately how the train could be run to time by doing away with the crossing stops, and retaining the existing engines. It will be instructive to consider how the same result could be obtained by using a more powerful engine and continuing to stop at the crossings and slow through the yard as at present.

We will assume that the existing engines have 18×24 cylinders, 1,100 square feet of heating surface and weigh 90,000 lbs., the tender weighing 65,000 lbs. with coal and water. In order to obtain an engine capable of exerting 25 per cent. more tractive force, the new engines would have 20×24 cylinders, and as they can not only exert more tractive force, but run some 8 per cent. faster, their indicated horsepower will be about 35 per cent. greater than the old that engines. This implies that 35 per cent. more steam must be made and 35 per cent. more coal must be consumed in a given time, and therefore the heating surface should be increased about 35 per cent. The engine should, consequently, have 1,500 square feet of heating surface, and the additional cylinder power and boiler capacity will probably increase the weight of the engine to 110,000 lbs. The tender is liable to be called on to furnish 25 per cent. more fuel and water in running a given distance, and as the speed will be higher, it would be well to increase the size of the wheels and axles, as well as the tank. These additions will probably make the tender weigh about 80,000 lbs. when ready for the road. In all, the engine and tender are 35,000 lbs. heavier, and the weights of the trains compare as follows:

	Old engine. Lbs.	New engine. Lbs.
Engine.....	90,000	110,000
Tender.....	65,000	80,000
Cars, 5¼ @ 55,000 lbs.	302,500	302,500
	457,500	492,500

The new train is therefore nearly 8 per cent. heavier, and the additional weight will absorb part of the additional power of the new engine in the following proportion:

$$\frac{125}{108} = 115.7.$$

The new engine can therefore, after allowing for its additional weight, exert 15.7 per cent. more tractive force than the old engine.

Assuming, for the sake of argument, that the resistance of a train at high speed varies directly as the square of the speed, the resistance of the old train and consequently the tractive power of the old engine may be expressed by the figures 2,500, or the square of the speed, 50 miles per hour. As the new engine can exert 15.7 per cent. more tractive force, its power and consequently the resistance of the train may be expressed as under:

$$2{,}500 \times 115.7 = 2{,}892,$$

and as

$$\sqrt{2{,}892} = 53.7,$$

the new engine will be able to take the train at a speed of 53.7 miles per hour, instead of at a speed of 50 miles per hour, the performance of the old engine.

To gain a speed of 50 miles the old engine had to perform work equal to lifting the whole train 88.75 ft., this figure allowing for the increased *vis viva* of the train due to the revolving parts. The new engine is evidently capable of doing nearly 16 per cent. better, and therefore can, in accelerating the speed of the train, perform work equal to lifting it 15.7 per cent. higher in traversing the same horizontal distance. In other words, it will attain a speed of 53.7 miles in the distance the old engine took to attain a speed of 50 miles per hour. As the average speed during the acceleration will be somewhat higher, the speed will be attained in less time. The higher speed will require a greater distance in which to stop, and this has been allowed for in the following table, which shows the performance of the new an d more powerful engine:

	H.	M.
Gaining speed and applying brakes, nine stops, in all 28 miles, at 32 miles per hour.....	0	53
Yard and crossing, 2 miles, at 15 miles per hour.....	0	8
Two crossings near station, 1 mile, at 15 miles per hour.....	0	4
109 miles at 53.7 miles per hour.....	2	2
Seven stops at 3 minutes.....	0	21
Total time for division	3	28

The use of the heavier engine run at a higher average speed would of course strain any weak bridges, and not be exactly beneficial to light or soft steel rails, even if they were provided with the latest and most improved form of rail joint, which would probably not be the case. It, therefore, seems possible that good signals and interlocking would possibly be the cheapest means of enabling the trains to be run to time, especially as they would mean increased safety for *all* trains, while the heavier engine run at a higher speed would be a source of increased risk.

PROEIT AND LOSS IN CARS.

We present in another column a large body of tables from a recent paper by Mr. E. C. Spalding, Car Accountant of the Western & Atlantic Railroad, which, for reasons explained in connection with the tables, give about the most definite and valuable existing data on the question of how much it costs to keep up cars and for just what items the cost is incurred. From the large Table 9 (of which we give elsewhere merely a condensation), we have computed the following table showing the cost per car per year and per car mile on the Western & Atlantic Railroad:

Cost of Car Repairs on Western & Atlantic Railroad.

	Passenger.	Local box.	Stock.	Coal and flat.	Line.
COST PER CAR PER YEAR.					
Running gear..	$94.80	$6.78	$7.46	$6.76	$19.09
Interior fittings..	23 45	.....	.....	.....	.....
Misc. material....	41.75	12.10	8.50	6.50	13.49
Total material.	$130.00	$18.88	$15.96	$13.26	$32.53
Labor.....	111.50	11.12	9.35	4.48	10.62
Total	$241.50	$30.00	$25.31	$17.74	$43.20
Miles per car.....	36,480	7,780	5,601	5,420	10,043
COST PER CAR MILE.					
	cts.	cts.	cts.	cts.	cts.
Running gear..	.178	.087	.133	.125	.191
Interior fittings..	.064	....	....	....	....
Misc. material....	.114	.155	.152	1.20	.135
Total material.	.356	.243	.285	.245	.326
Labor	.306	.143	.167	.083	.106
Total...	.662	.386	.452	.328	.432

The above includes, whether by chance or otherwise, no charges whatever for seats or upholstery of passenger cars.

These figures, as will be seen from a communication from Mr. Spalding which appears in another column, include all work done in the car department for maintenance of cars, both repairs and renewals.

The Lake Shore & Michigan Southern Railway is one of the few roads which makes, or attempts to make, a separation between expenditures on "repairs of cars" which are for repairs proper, and which are for renewals, and this distinction it carries only to the extent of reporting separately the number and cost of cars built *entirely new* to replace old numbers. That only a small portion of the real "renewals" are made

in this form, and that many of them are "renewed" in the same manner as a beggar renews his coat, new sleeves to an old body, new body to old sleeves, is shown in a clear and interesting way in the following figures, which are likewise valuable for comparison with the Western & Atlantic:

Cost of Freight Car Repairs on Lake Shore & Michigan Southern Railway for Six Years.

YEAR.	Cost car per year.			No. of cars.	
	Repairs only.	New cars built for ac. "repairs."	Total repairs and ren'ls.	Total in use.	Built new for renewals.
1880	$47.80	$4.00	$51.80	12,107	107
1881	43.46	2.74	46.20	14,663	66
1882	38.90	1.59	40.49	16,796	58
1883	30.64	5.56	36.20	16,649	197
1884	21.24	3.17	24.41	16,355	108
1885	35.30	1.05	36.35	16,629	38
Total, 6 years	$217.34	$18.11	$235.45	.....	574
Av. per year.	$36.22	$3.02	$39.24	15,520	95.7

It will be seen that in these six years, during which, in the ordinary course of nature, something like a third of a stock of cars should need rebuilding, only some $3 per car per year has been spent for rebuilding old cars all at once, and only 574 cars, instead of some 5,000, which would be the more natural number, have been entirely rebuilt. To keep the stock of cars good by renewing it *in this way only* would require that each car would last some 112 years ($500 less $150 for scrap value, divided by $3). Thinking there might be something peculiar or deceptive in these figures, we have gone back to 1870, when the present corporation first came into existence, and because of the fortunate fact that the Lake Shore specifies each year just how many complete new cars are built on repair account we have been enabled to compile the following:

Lake Shore & Michigan Southern Freight Equipment and Renewals, 1870-1885, 16 years.

Year.	No. freight cars on road.	No. rebuilt account repairs.
1870	6,077	121
1871	7,321	287
1872	9,025	247
1873	9,843	204
1874	10,185	307
1875	10,273	157
1876	10,282	291
1877	10,277	242
1878	10,280	212
1879	10,946	165
Average	9,451	2,233 (total)
1880-85 as above	15,520	574 "
General average and total	11,729	2,807=176 per yr.

During these 16 years the 6,077 cars in use in 1870 (then averaging, probably, five or six years old) must at least have been practically all renewed, and taking into account the cars destroyed by fire, by accident, by premature decay from original bad construction, by abandonment before really worn out because no longer equal to modern loads and requirements (a very important cause, which has led thousands of cars to be renewed complete instead of continuing the usual process of patching, and which alone suffices to exthe rebuilding complete of as many as the 2,807 cars above in 15 years)—from all these causes combined something like 10,000 or more cars should have been rebuilt complete on the Lake Shore road, instead of the small number of 2,807, or 176 per year, which latter number is entirely inadequate to keep good the average stock of 11,729 cars, unless a large majority of them are rebuilt piece-meal.

These facts make entirely clear the unquestionable and notorious fact that it is entirely impossible to draw any sharp line between the repair and renewal expenses which together make up the aggregate for "maintenance of cars" on all American roads, and that it is never attempted, yet we find in the last issue of the *American Railroad Journal* a renewed claim that Mr. Spalding's figures did not include any renewal expenses—with the resulting conclusion that the present maintenance charge is nearly half too small—with an attempt to support it by the very Lake Shore figures which we have given above. The fallacy of the argument made—or one of the fallacies—lies in the assumption that the Lake Shore repair expenses, after deducting the cost of the few cars rebuilt new all at once, do not include the *equivalent* of any renewal expenses. But if they do not, what becomes of the old stock? Allowing that the average life of a freight car were 20 years, one-twentieth of the original stock, or 605 cars per year, must be renewed in some way or other, and really it would come nearer to 900 or 1,000 cars. Has the Lake Shore, then, been dropping out old cars altogether as they wore out, and charging several hundred new cars to replace old ones per year to capital account or to some other items than "repairs of cars" in its operating expenses, *besides* adding 754 cars per year to the total number of its equipment, as it has done, on an average, during these six years? Plainly not.

Unless Mr. Spalding's figures, therefore, were based upon a year which was not a fair average as respects the car repair expenditures on his road—in other words, unless he chose a year for his investigations in which the stock was not kept good, but allowed to run "down and out," there was no escape from the conclusion, based on his paper alone, that he did include renewal charges, as he states he did.

The very figures quoted in the last issue of the *Journal* for the Lake Shore road show clearly, it appears to us, that the mileage rate of ¾ cent per mile is in fact ample, and not nearly half too small, as appeared from the statement we objected to, as thus:

Average cost per year per car for "running repairs" on Lake Shore & Michigan Southern Railway for the six years, 1880-1885, after excluding all expenses for rebuilding cars entirely new on renewal account, and allowing that the remaining total *contains no renewal charges*, nor any equivalent therefore, which we have shown above to be improbable	$36.22
Mileage per year necessary to earn that sum at ¾ cent per mile	4,830
Mileage necessary to earn 5 per cent. interest on capital invested in car ($500), or 25 per year	3,333
Mileage necessary to renew the car *every ten years*, estimating cost of renewal at $350 ($500 less $150 for old material), 46,667 miles, one-tenth of which is	4,667
Total mileage per year necessary to make the car show a fair return to the company	12,830

As 13,000 miles per year is about the estimated average mileage of all the cars in the United States, this makes a good enough showing, but it is unfairly unfavorable, in that (1) it charges a good part of the renewal expenses twice over, and (2) renews the car far too quickly. Were there any such loss in fact in the average mileage rate as was claimed in the estimate to which we took exception, it may be assumed that the important roads which are chronically "long" of cars would long since have been heard from emphatically on the subject, or rather, would never have assented to the drop from 3 cents to 2 cents, to 1½ cent, to 1 cent, and at last to the present rate, ¾ cent, as has actually taken place.

One fact which comes out curiously in the table first given above we may briefly note in closing. It will be seen that, contrary to what might be expected, the cars which make the largest mileage per year cost the most per mile for maintenance. The chief reason for this is, probably, that they are maintained up to a higher standard, but as the cars in local service are (1) subjected to more banging and more frequent use of brakes, and (2) make a smaller mileage per year, so that the rotting and other effects of time and age are divided up among a smaller number of miles, we should expect to see a somewhat higher cost per mile run for such cars. On the contrary it is smaller, both for running gear only and for the aggregate of all items.

Trunk Line Through Freight in November.

The east-bound movement of freight from the western termini of the Eastern trunk lines continues heavy, having been in November, in tons:

Year.	Tons.	Year.	Tons.
1880	1,121,616	1884	988,093
1881	818,404	1885	982,166
1882	1,085,720	1886	1,069,225
1883	939,824		

Thus the east-bound movement this year was 9½ per cent. more than last year, and was exceeded only in 1882 and 1880. The increase over last year was probably entirely due to a large grain movement, there having been a light provision movement.

For the 11 months ending with November this east-bound movement over the trunk lines has been:

Year.	Tons.	Year.	Tons.
1880	10,472,227	1884	9,189,819
1881	10,131,298	1885	10,358,130
1882	8,879,629	1886	10,505,665
1883	9,314,559		

Thus for the 11 months the movement this year has been larger than ever before, though only a very little greater than in 1885 and 1880.

The shipments for the five months since June, which show the course of traffic as effected by the last harvest and the existing conditions, have been:

Year.	Tons.	Year.	Tons.
1880	5,354,991	1884	4,528,019
1881	4,909,105	1885	4,705,183
1882	4,725,320	1886	5,293,421
1883	4,533,085		

Thus for the last five months the east-bound movement has been 588,238 tons (12½ per cent.) larger than last year, while for the first half of the year it was nearly 8 per cent. less than last year. The shipments this year since June have been much larger than in any other years since 1880. The increase this year, notwithstanding higher rates than in 1885 and 1881, and after five years of no growth in this traffic, is encouraging. In November rates were the same this year as last and probably maintained equally well, but in previous months, and especially previous to October, rates were much lower last year.

Further investigation shows clearly that the large increase in New York shipments to the West in November was due entirely to an exceptional movement of iron, etc., and not to larger sales of general merchandise. For the shipments of each of the five classes were this year and last:

	1886.	1885.	Inc. or Dec.
1st class	17,388	19,898	— 2,510
2d class	8,397	6,932	+ 1,465
3d class	6,682	5,397	+ 1,285
4th class	26,483	27,733	— 2,250
First 4 classes	58,950	59,960	— 1,010
5th class	43,022	25,766	+17,736

Thus the whole (and more) of the large gain was in the lowest class, which includes sugar and the coarser irons.

That the great increase in shipments was due to a diversion from the canal is indicated by the fact that at Philadelphia and Baltimore the shipments of fifth-class freight were a little less this year than last. Moreover in October last the shipments of fifth-class freight from New York were very little greater this year than last, while this year we see they were nearly 70 per cent. greater.

The total through shipments from Philadelphia and Baltimore were a very little greater this year than last, and they have been in November for seven years, in tons:

	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Phila.	19,991	30,439	22,587	19,352	15,593	23,716	24,257
Balt.	17,592	15,702	11,566	11,583	9,919	14,773	15,035

Thus the Philadelphia shipments, though but little more than last year, were larger than in any other year except 1881, while the Baltimore shipments were exceeded only in 1880.

The Chicago shipments of through freight eastward (not including live stock and dressed meat), in the month of November by the lines in the Central Traffic Association were 151,203 tons, which the unreported shipments over the Chicago & Atlantic may have brought up to 176,000 tons. Since 1878 these Chicago shipments in November have been:

Year.	Tons.	Year.	Tons.
1879	168,274	1883	241,577
1880	212,840	1884	244,496
1881	216,506	1885	217,661
1882	214,295	1886	176,000

Thus the shipments this year were 20 per cent. less than last year, and much less than in any other November since 1880.

For the 11 months ending with November these Chicago shipments have been (estimating the Chicago & Atlantic since March this year):

Year.	Tons.	Year.	Tons.
1879	2,292,584	1883	2,198,799
1880	2,064,850	1884	2,551,964
1881	2,629,991	1885	2,047,344
1882	1,849,858	1886	1,920,000

Thus the shipments for the 11 months were less this year than in any other of the eight except 1882, which is the more remarkable because the shipments last year were the largest ever known, and the decrease from that year is 1,027,000 tons, or 34¾ per cent. Last year, however, a very large part of the shipments were diverted from the lake vessels by very low rates

The shipments of live stock and dressed beef from Chicago eastward in November were 85,732 tons this year, against 63,478 last year, an increase of more than one-third. This was largely due to the strike of the packing-house men, which caused hogs to be forwarded to eastern packing-houses, and cattle to be sent east to be butchered, instead of the beef of those cattle, weighing three-sevenths less.

For the first time since we have the records the shipments of dressed beef fell off largely. The live cattle and dressed beef shipments in November were, in tons:

	1886.	1885.	Inc or Dec.	P. c.
Cattle	32,353	22,620	+ 9,733	43.1
Beef	18,441	12,893	+ 5,548	43 1
Dressed beef	17,497	21,387	— 3,890	18.2
Total beef	35,938	34,280	+ 1,658	4.8
P. c. dressed	48.6	62.4	— 13.8	

Thus in spite of the strike Chicago supplied more beef to the country in November this year than last; but the strike reduced the dressed beef shipments 18 per cent. below those of last year, while the shipments of live cattle increased no less than 43 per cent. For the first time since May, 1885, the live cattle shipments supplied more meat than the dressed beef. The shipments of live hogs were also larger than in any previous month of this year or last.

The Winter East-bound Rates.

It has been agreed, after more than the usual delay, to advance east-bound rates from the basis of 25 and 30 cents per 100 lbs. from Chicago to New York to 30 and 35 cents, to take effect Dec. 20. We do not remember any previous year when the winter rate, if there was any, was made later than Dec. 1, but we remember several years when after such an advance, and usually after New Years, the rates have gone down more or less rapidly, until they were below the fall rate. For a few weeks before and after the close of lake and canal navigation the railroads are usually very busy, with local, if not with through traffic, and they have been this year, and are now. After Christmas we cannot be so sure. The only freight move-

ment likely to be affected by the advance in rates is that of wheat and flour for export. The exports of these recently have been a large part of the receipts at the seaboard. The price abroad is now fixed by the supply from many parts of the world besides this, as India, Russia and our own Pacific coast, and an advance in the cost of transportation in this country will not be paid by the foreign consumer—at least only a small part of it will be paid by him. If the exports of these are to continue, the producer must pay any increase in the cost of transportation to the seaboard. If this has a considerable effect on the price, probably our wheat will be held till navigation opens in the spring to a greater extent than would occur if the rate were lower, and the winter rail movement will be reduced by so much. The larger part of the winter movement will be for domestic consumption, no doubt, in any event, and this movement will be about as great at a 30-cent as at a 25-cent rate; but it is important that everything possible should be done to enable American wheat producers to export their surplus at a living price. Doubtless, most of the wheat will have already come forward, as it always does, before Dec. 20, when the 30-cent rate goes into effect. Thus the receipts of the Atlantic ports from July 24 to Dec. 4 for four years have been:

	1883.	1884.	1885.	1886.
Flour, bbls.....	6,197,456	6,866,098	6,540,187	6,629,804
Wheat, bus	34,513,254	50,263,893	24,293,407	52,491,328
Total, bus	62,401,806	81,267,334	53,724,248	82,325,446

while from Christmas to June the receipts have been:

	1883.	1884.	1885.	1886
Flour, bbls.....	7,103,718	6,350,540	7,357,803	6,163,709
Wheat, bus.....	25,282,626	18,328,640	20,718,969	16,807,376
Total, bus.....	57,249,357	46,906,070	53,829,082	44,544,066

Thus 28,600,000 more bushels of wheat than last year have reached the seaboard since June, while the entire seaboard receipts last winter from Dec. 20 to the opening of navigation in the spring (at a 25-cent rate) were only equivalent to 20,465,000 bushels, more than four-fifths of which was flour.

The stocks of wheat in store in Western elevators are about 3,000,000 bushels more than last year—39,434,000 against 36,543,000; but the excess is wholly at Duluth, which has not hitherto made any winter shipments, and at Chicago, Milwaukee, Peoria, Indianapolis, St. Louis and Kansas City, which usually afford the bulk of the winter shipments, the stock is but 21,920,000 bushels this year, against 20,974,000 last year. There is, therefore, little reason for expecting a heavier wheat movement this winter than last, unless the stocks in farmers' hands are greater, and probably they are not much greater.

The Conference Committee's Inter-State Commerce Bill.

The inter-state commerce bill has come up in Congress so early this year that in spite of the shortness of the session there will probably be time enough to bring it to a vote in both houses. Last year the Cullom bill, providing for a National Railroad Commission, passed the Senate, but in the House the Reagan bill was substituted for it. Thereupon a conference committee was appointed, and it is the report of this committee which brings the matter before Congress thus early. The conference committee has made a compromise, preserving certain features of both bills, including the most objectionable features of both. It provides for a Commission, which is in every way desirable, and prohibits unjust discrimination, which ought to be prohibited, but it preserves the short-haul clause, and requires that permission be obtained in advance from the Commission for every case of making rates higher for a longer than for a shorter distance, which is impracticable unless the Commission grants the application without examination, because the cases in which such rates are required are so numerous. Furthermore, everything in the nature of an agreement for the division of traffic and the maintenance of rates is strictly prohibited, and the enforcement of this would put back ten years the rational development of the transportation business in the direction of uniformity and stability of rates. It becomes plainer and plainer every year that without some such co-operation among the railroads, or uniformity in action otherwise secured there will be very frequent and very great variations in rates, and great differences at different places, insufferable to the community and disastrous to the railroads. We shall never get the full benefit of our railroads until they are worked in many respects as one system, and we are confident that this will be obtained. We are approximating that condition now by the co-operation of the railroads in their pooling agreements, which have yet to be extended and developed in order to effect all that is desirable, for all parties concerned. If development in that direction is absolutely blocked by legislation, unity will be sought and attained nevertheless, most probably after great disasters, by a series of consolidations, or their equivalent, on a gigantic scale. Whatever direction it takes it is perfectly proper that the community should insist that the carriers in providing for their own interests should provide properly for the public interests; but what the inter-state commerce bill proposes is to interrupt the development which is going on, and promises to be especially suited to the circumstances and needs of this country and the character of its government and people, and substitute original chaos in its place. The tendency of things in this country of late years has been to preserve numerous independent organizations, to continue the most favorable features of competition, without the great fluctuations in rates due to unrestricted competiton, and especially to encourage and facilitate improvements which reduce the *cost* of transportation, in which this country has been and is still making wonderful progress. Legislation for the protection of the public should recognize, harmonize with and facilitate the natural development of the national railroad policy, and not flatly arrest it.

The full text of the new bill has not yet been printed. Further comment is reserved until its contents are more definitely known.

The New York & New England road passes, at the election this week, under the control of a new board of directors composed chiefly of New York men, the Boston people who have managed the road so long being dropped from the board, with the exception of two or three, who have not been prominent. The new managers do not announce their intentions as yet, although they intimate that all talk of a lease of the road or of a combination with the New York, New Haven & Hartford or the Boston & Albany is to be dropped, and that the New England road is to be entirely independent. They further intimate that it is to be made a line connecting Boston and New York, free from all others.

The new President, Mr. J. A. Bostwick, is a man of large wealth, and has been engaged in extensive business enterprises, but has had little or no railroad experience. As he is understood to be largely interested in the projected line from Danbury to New York, it is probable that the New York & New England is to come to New York city by the Danbury route. This will not make it the shortest line between Boston and New York by any means. It must also be remembered that to permit the fast running which will be required of a competitor for this business, a considerable amount must be expended in improving the old line from Hartford to Danbury, as well as in building the new road from Danbury to New York. The New England Company is not at present in a condition to stand additional burdens without a considerable increase of traffic. Altogether, its future seems to be still uncertain.

Steel-Tired Car Wheels.

On going through any car repair shop on a road where steel-tired car wheels are used under passenger equipment, several tires will generally be noticed to be very unevenly worn. The tire on one end of the axle will be found with a square flange, while the wear on the other wheel is altogether clear of the flange and on the outer part of the tread. There is in many quarters a disposition to attribute this to the uneven or bad quality of the steel tire and the sharpness of the curves over which it has to run, and it is sometimes considered an inherent defect which cannot be cured by any care on the part of the master car-builder or his staff. The *uneven* wear of steel tires indicates, however, that the curves are not responsible, unless the car has been running over a short branch on which there are only one or two sharp curves all in the same direction. This, of course, is very seldom the case, and on any ordinary line the wear on a properly fitted pair of wheels running under well-built truck will be precisely the same for any two wheels on the same axle. The quality of two tires of the same lot, by the same maker, does not differ perceptibly, and, if it did, would not cause the wheels to run to one side. The cause is often to be found in the construction of the truck, too many of which are out of square after a few weeks' running.

Another frequent cause of uneven wear is the fact that wheels are often pressed on an axle the right distance apart, but the distance from the centre of one journal to the back of the nearest wheel is different at the two ends of the axle. When such a pair of wheels are placed in the centre of an otherwise properly constructed six-wheeled truck, the one flange must inevitably be forced against the rail, while the flange of the other wheel will never touch the rail.

It should be borne in mind that it is far more important to prevent flange wear on steel-tired than on chilled wheels. The latter can fail to give a long mileage by cracks, shell-out and other defects that are quite independent of the accuracy with which the truck is built or the wheels are fitted on the axle. A steel tire will, however, rarely give out except from one cause, wear. It is not nearly so hard as the chilled wheel and shows the effect of flange wear much sooner, and therefore all possible effort should be used to prevent it.

A chilled wheel must be cast aside and can be remelted when it fails from any cause, either by flange wear, or by the chill being worn through, or by any defects, such as cracked brackets or shelling out. In either case, provided the mileage is the same, the cost is the same. One cause of failure is no more expensive than another. But the case is widely different with a steel tire. If worn fairly on the tread the tire will stand four turnings, while if worn badly on the flange it will not stand two turnings, so much metal having to be turned off to get a flange of the proper thickness.

In going through shops, we frequently see one steel-tired wheel barely worn on the tread, while its fellow on the other end of the same axle has the flange worn down square. The car has to be stopped and the wheels taken off and re-mated and the tire with the cut flange reduced perhaps one inch in thickness in one turning, in order to get a fresh flange. All this trouble might have been avoided by a little extra car, in building the truck square and placing the wheels in the proper distance on the axles, not only correct to the gauge between the backs of wheels, but also exactly equal on the gauge from the back of the wheel to the centre or collar of journal. This system has been carefully followed for some years by Mr. Griggs on the Providence & Worcester, a road abounding in curves, and the result can be seen in walking through his shop and examining his worn wheels. No instance of uneven wear will be found. This seems to show very conclusively that uneven wear can be prevented.

Grain Exports in November.

The breadstuffs exports in November last were the largest quantity there have been in any November since 1881, and the most valuable of these exports, flour and wheat, were especially large, exceeded only in 1882, and then but slightly. But the *value* of the exports was the smallest since 1878, at least with the exception of last year and the year before. The November exports of flour, wheat, corn and all grains, and their aggregate value in each of the last five or six years have been, in bushels (to which flour has been reduced):

Year.	Flour.	Wheat.	Corn.	All grains.	Value.
1881....	2,177,077	9,707,810	4,189,382	16,489,672	$18,025,880
1882....	3,882,739	8,825,845	634,189	13,753,113	15,290,494
1883....	4,137,691	6,764,837	2,815,041	14,475,090	14,657,325
1884...	3,246,997	7,609,191	1,845,887	13,407,475	11,050,402
1885...	2,782,296	2,553,404	2,803,516	9,063,559	7,149,785
1886..	4,129,363	8,201,029	3,013,589	15,768,769	12,598,841

The flour exports this year were the largest ever made in November except in 1883, but the wheat exports were exceeded in several years previous to 1883. The corn exports were the largest since 1881, as were the total exports. Compared with last year there is an increase of 48 per cent. in flour, 221 per cent. in wheat, 7½ per cent. in corn, and 74 per cent. in total exports, and an increase of 76 per cent. in their aggregate value. Compared with 1883 there is an increase of 9 per cent. in quantity and a decrease of 14 per cent. in value; compared with 1882 an increase of 14⅜ per cent. in quantity and a decrease of 17 per cent. in value; and compared with 1881 a decrease of 4⅓ per cent. in quantity and of 30 per cent. in value. The exports this year were larger in November than in October, but less than in September or August.

For the five months and the 11 months ending with November the quantities and values of the exports of flour and grain of all kinds for seven successive years have been:

	—5 months to Nov. 30.—		—11 months to Nov. 30.—	
Years.	Bushels.	Value.	Bushels.	Value.
1880..	146,303,818	$134,953,931	275,495,095	$257,310,316
1881..	94,740,871	98,337,515	211,661,919	210,318,432
1882..	87,565,142	100,734,766	144,843,467	165,591,075
1883..	77,802,782	74,590,521	164,605,678	159,739,456
1884..	74,578,379	65,338,965	146,598,397	133,451,861
1885..	53,417,031	42,821,544	151,625,381	119,572,868
1886..	77,420,393	65,215,108	172,348,542	135,076,674

The quantity exported since June, thus has been 45 per cent. more than last year, nearly 4 per cent. more than in 1884, nearly as great as in 1882, but much less than in the three years previous, and 47 per cent. less than in 1880. The *value* of these exports for five months, though 55 per cent. more than last year, was less than in any of the others, though very nearly the same as in 1884. The decrease in value since 1883 is 12½ per cent.; since 1882, 35 per cent.; and since 1880, 51⅜ per cent. The figures for the five months best indicate the present course of traffic. In the first half of the year the exports were governed by the crop of 1885, which was very light in wheat, though large in corn. For the whole eleven months the quantity exported this year was the largest since 1881, but 18⅓ per cent. less than in that year and 36½ per cent. less than in 1880, while the value of the exports this year was but 1¼ per cent. more than in 1884, in spite of the increase of 17 per cent. in quantity, and is much less than the value in any of the four years previous to 1883—36 per cent. less than in 1881 and 48 per cent. less than in 1880.

It is noticeable that the exports of wheat and flour have been enormously greater this year than last since June, namely, 62,036,177 bushels, against 29,587,340, but this was because the exports were very small rather than very large last year, the exports of wheat and flour in the four months from July 1 to Nov. 30 for six years having been:

Year.	Bushels.	Year.	Bushels.
1880.....	95,564,208	1884.....	60,765,530
1881.....	62,549,164	1885.....	29,587,340
1882.....	83,241,149	1886.....	62,036,177
1883.....	50,936,661		

The exports of flour and wheat for the five months this year therefore were the largest since 1882 and nearly as large as in 1881 (which was after the worst of wheat crops, however), but they were but little larger than in 1884, were 25 per cent. less than in 1882 and 35 per cent. less than in 1880.

The average of the five years 1880 to 1884, inclusive, was 70,611,000 bushels, which is much greater than this year. But the increase over last year is not less than 110 per cent.

An English Guide to the United States.

Almost every English-speaking person who has ever traveled abroad has heard of "Bradshaw," which we believe has long been only a name, not a person. The name is attached to numerous guides to all parts of Europe, and to the general railroad guide of Great Britain. We now find a "Bradshaw" for the United States, which is unique of its kind, almost as good in its way as the Portuguese manual of "English as She is Spoke," which most of our readers have probably heard of.

The most uniformly amusing part of this work is the traveling directions; but for this we should not hold the compiler of "Bradshaw" responsible, since he assures us in italics that "To many places no route whatever is given, which in every case *is owing to the omission of the General Passenger Agents* of the lines leading to the same to furnish the needed information." It is an inevitable inference from this that those routes which are given have come mostly from those gentlemen, who are well known to be somewhat unscrupulous in the mapping line, but who have not heretofore had credit for being quite up to such cool practical jokes as the traveling directions in this volume indicate.

The volume of 300 pages opens with a general sketch of America and the Americans, which is funny enough in its way but which need not detain us. Taking only a few samples of the town directions, almost every one of which contains absurd errors, we have the following:

"*Albany, N. Y.* Reached from New York *in* 8 *hours.*

"*Altoona, Pa.* Reached by Pennsylvania Railroad from Philadelphia *in* 11 *hours.* Travelers arring at night stop so as to see the Alleghenies by daytime.

"*Baltimore, Md.* Reached by Baltimore & Ohio Railway from New York in 7 hours.

"*Batavia, Ill.* Reached by Chicago, Burlington & Quincy from Chicago *in* 11 *hours* (something less than 2 hours).

"*Beloit, Wis.* Reached by Chicago, Milwaukee & St. Paul from Chicago *via* Lacrosse and Sioux City (!) *in* 32 *hours* (it is 91 miles).

"*Brooklyn, N. Y.* Reached from New York by ferry from Fulton street *in* 20 *minutes.*

"*Buffalo, N. Y.* Reached by Delaware, Lackawanna & Western Railway from New York *via* Scranton, in 15 hours." [This is but a sample of the usual rule that wherever there is more than one line the least known and least used is given.]

Perhaps these will suffice as samples chosen quite at random from prominent points in the first two letters of the alphabet. Passing to the middle of the alphabet we may note that the unofficial health department of New York city consists of "*Medical:* Dr. James, Dr. Jones," and the dental staff is represented by "*Dentist:* Dr. McAmes." Two of these gentlemen we do not find in the directory. The third is so numerously represented that in the absence of initials and address it would be rather difficult to determine who was honored by the reference. In Philadelphia "Drs. Fox, Gross" divide the medical honors, and "Dr. Mason" is the favored dentist. The place is reached from New York by the "Baltimore & Ohio Railway in 3 hours," and Pittsburgh is reached from New York in 23 hours.

But the time of travel is not always too great. For instance, Portland, Oregon, is stated to be reached from San Francisco in 29 hours, when 24 hours of staging alone is still needed. Turning toward the end of the volume we notice the unkindest cut of all, that "the *Washington Monument* is *one of the* [italics ours] largest in the world." We also learn that "*Arlington House*" (was) "the old residence of George Washington" and many other items of real news which we cannot stop to quote. How so large and varied an assortment of surprising information for both Americans and Englishmen could have been allowed to get into and stay in a professed guide-book, prepared by experienced publishers of guide-books, will probably ever remain an unsolved problem. Certainly we cannot even attempt a solution.

The cotton exports in November, as reported by the Bureau of Statistics, were a little greater this year than last (334 million pounds, against 329⅛ last year), but a little less in value. For the three months of the crop year ending with November the exports were:

	1886.	1885.	Increase.	P. c.
Pounds	706,257,729	686,515,928	19,741,801	2.9
Value	$66,827,096	$69,532,663	$2,704,567	3.9

The changes are not very great.

The grain shipments by lake continued past the 1st of December, but they were for the week to Dec. 4 less than a million bushels, which will probably be the last of the season. But while the lake shipments have been decreasing, so have the rail shipments, and for the week to Dec. 4, the latter were the smallest since July. In September the average rail shipments were 2,240,000 bushels per week, in October, 2,215,000, and since they have been:

Week ending.				
Nov. 6.	Nov. 13	Nov. 20.	Nov. 27.	Dec. 4.
1,600,401	1,665,020	1,578,439	1,271 966	1,230,243

Thus the entire grain shipments from the West have fallen off rapidly. It is not usual for the rail shipments to fall off at this time, as the following statement of them for five years shows:

Week to	1882.	1883.	1884.	1885.	1886.
Nov. 6	2,214,837	2,026,842	2,154,278	1,398,375	1,600,401
" 13	1,751,257	2,375,648	1,910,252	1,339,470	1,665,020
" 20	1,106,624	2,371,186	2,499,118	1,582,868	1,578,439
" 27	2,071,628	2,427,292	1,995,154	2,108,920	1,271,966
Dec. 4	2,160,290	2,974,842	2,322,783	2,072,450	1,230,243

It will also be observed that not only have the rail shipments decreased this year, as the difficulties of navigation reduced the lake shipments, but they have been very much less of late than in any of the four years previous. We must not conclude from this, however, that railroad traffic has been unusually light this year. On the contrary, it has been heavy, and it has been impossible to get cars enough to supply the demand. This particular traffic has been unusually small, but much other traffic has been unusually large.

The Chicago *Tribune* complains of the arrogance of the trunk lines in imposing a 30 cent rate on on the Western connections, Dec. 20. As the Western connections requested the advance to be made Dec. 1, and it was because some of the trunk lines would not agree to it that it was not done, and as advances are made only by the unanimous consent of the roads interested, it is difficult to see where the arrogance comes in, unless it is in having delayed for 20 days the advance in rates which the Western roads requested.

We have received from the *Mechanical Engineer*, without a word of further comment, a copy of the first page of its issue of Sept. 4, with the paragraphs marked which *The Engineer* alleged to constitute what we called "An Eccentric Contradiction," as quoted in our last issue. It becomes clear by examination of the page that in objecting to the two contrasting rather than contradictory paragraphs which appear on it, *The Engineer* was decidedly hypercritical. The first article is a description *quoted from another journal* of "Cawley's positive valve-gear," which dispenses with an eccentric. It naturally opens with a statement of the objections to eccentrics. The second article is in the nature of an editorial note, and says in effect that notwithstanding the many devices for dispensing with eccentrics, they have so many good points that they are not likely to be soon deposed.

As eccentrics, like most other things, have both their good and bad points, and as it is certainly permissible in a journal which believes eccentrics will not speedily be deposed to publish and illustrate devices for dispensing with them, nevertheless—and still more to reproduce them on their merits from other journals—we regret to have give currency to a criticism which chiefly shows how even literal quotations may misrepresent facts when dissociated from the context.

The full pamphlet report of the third annual inspection of the Savannah, Florida & Western and the Charleston & Savannah railways reaches us in the same admirable form as that of the two preceding years, each of which we have more fully noticed. Premiums of $100 and two of $50 are awarded for the best supervisor's division; $40 and $20 to the foreman of the best section on each division, and $10 to the *wife* of each foreman (if he has one, or if not, to himself) for the neatest section house and grounds. The foreman on each division showing the greatest improvement gets $15, regardless of absolute rank, and the foreman of each division who has the least expense for labor without a falling off in standing, or with a slight improvement if his standing was heretofore low, receives $10. Finally, the foreman who has done his work with the least expense for tools per man receives a premium of $10.

Thus it will be seen that the favors are pretty impartially distributed. In marking, 10 each is assigned to line, surface, level, frogs and switches, drainage, policing. Each mile of each section is marked, and the average of the averages gives the final result. For the entire road the averages have been:

	Line.	Surface.	Level.	Frogs, etc.	Drainage.	Policing.	Average.
1886	8.46	8.47	7.43	7.87	8.17	7.66	8.083
1885	8.43	6.88	7.10	8.62	6.31	8.10	7.601
1884	8.63	8.02	6.72	8.99	7.70	7.68	7.950

The stimulating effect of such a system on the care taken with track cannot but be great.

A hint as to a method of observing the best size for passenger car wheels is contained in the proceedings of the New England Railroad Club, elsewhere reported, which is well worth noting. In passing over a railroad grade-crossing the effect of the joints which occur every 30 ft. along the line is much intensified, and by observing the comparative noise of 42-in. and 33-in. wheels in passing over it a very good idea should be obtained of the effect on the general riding of cars. It was said by Mr. Adams that there was a very noticeable difference, as it seems rational that there should be.

The manufacture of new car-coupler patents still goes on a the rate of 8 to 10 per week, or say 450 per year, which is about equal to its highest rate heretofore. Therefore, if none of the existing devices are deemed satisfactory, we have only to wait long enough to find one that will be among the new patents—perhaps. That any one can have the heart and the pluck to take out these new patents—some of which are the most extraordinary looking devices—in the face of the easily ascertained facts of the existing situation will probably ever remain a mystery. Among the eight new patents in the issue of the *Official Gazette* before us, every one is of the link type.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Atchison, Topeka & Santa Fe.—The *Great Bend Branch* is extended from Rush Centre, Kan., west to Alexander, 14 miles. The *Texas Extension* is extended south to Ponca, Ind. Ter., 11 miles.

Colusa & Lake.—Completed from Colusa, Cal., west and southwest 22 miles.

Denver, Memphis & Atlantic.—Additions of 23 miles are reported.

Indiana, Illinois & Iowa.—Extended from North Judson, Ind., east to Knox, 9 miles.

Missouri Pacific.—The *Verdigris Valley, Independence & Western* line is extended from Independence, Kan., west to Winton, 8 miles. The *Greenville & Dallas Branch* is extended to Rockwall, Tex., 9 miles.

St. Louis, Ft. Scott & Wichita.—The *Wichita & Colorado Branch* is extended from Elmer, Kan., northwest to Hutchinson, 6 miles.

San Antonio & Aransas Pass.—A branch is completed from Kenedy Junction, Tex., to Yorktown, 25 miles.

Taylor, Elgin & Bastrop.—Extended from Elgin, Tex., south to Bastrop, 19 miles.

Western Maryland.—The *Baltimore & Cumberland Valley Branch* is extended through Shippensburg, Pa., 0¾ mile.

This is a total of 146¾ miles on 11 lines, making 6,719 miles reported so far this year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.		Miles.
1886	6,719	1881	7,808	1876	2,278
1885	2,699	1880	5,997	1875	1,333
1884	3,652	1879	3,643	1874	1,844
1883	5,997	1878	2,263	1873	3,630
1882	9,799	1877	1,994	1872	7,160

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

The *Railway Service Gazette* and the *American Railroader* have been consolidated, and will hereafter be published weekly in Toledo, O., under the title of the *Railway Service Gazette and American Railroader.* The consolidated paper will doubtless be able to fill its special field much better than two rival papers would have done.

The *Railway Section Foreman*, heretofore published by Brown, McInteer & Co., at Mt. Auburn, Ia., will hereafter be published at La Porte City, Ia., by McInteer & Wasson. It is, as we have heretofore noted, a monthly paper devoted to questions relating to the maintenance of way, and to personal and other news of interest to roadmasters and section foremen. This paper has been made the official organ of the new Brotherhood of Railway Section Foremen, and will be under the editorial charge of Mr. M. McInteer, Grand Chief Foreman of the Brotherhood.

TRADE CATALOGUES.

Price List of Punches and Shears, Watson & Stillman, New York.

A very complete assortment of these tools, with prices, weights, views and other details attached, is shown in this brief catalogue.

Catalogue of the Complete Combustion Company, Boston, Mass.

This small but excellently prepared catalogue gives a clear and full description of a new system of heating, the chief peculiarity of which lies in the boiler and fire-box, which certainly seems to embody features of merit and will be examined with interest by those having to do with the heating problem. Included in the company's apparatus is a system of heating cars, but it is not restricted to that.

THE SCRAP HEAP.

Picked up.

Give us that railroad. As we understand it, the road is to be the Shreveport, Minden, Homer, Shiloh, Stein's Bluff, Farmerville, Ouachita City, Bastrop, Floyd, Milliken's Bend & Vicksburg Railway. Its name may kill it, unless Brother Puckette, of the Shreveport *Times*, can help it out with a moral idea or two.—*Farmersville (La). Gazette.*

He was a nobby young man of blue blood and good financial backing, and as he sat down in the car he pulled out his handkerchief. An odor of perfume was wafted through the car, and a boy sitting beside his mother suddenly called out: "Say, ma, why can't we buy onions which smell as nice as that?"—*Detroit Free Press.*

"Ma, what is this coal pool I read about in the papers?" asked little Johnny. "I'm sure I don't know," was the reply, "unless it is where miners go in swimming."—*Exchange.*

A Liberal Man.

A Baltimore capitalist who paid $180,000 for 300 acres of Alabama coal lands, was lately waited upon by a stranger, who said he lived near the purchase, and added:

"Now, 'squire I want that ar land to make a farm for my two boys, and I'll make ye a liberal offer."

"Well, state your price."

"I'll give ye plump $3,000 in cash, and I don't care how soon you make out the papers, considerin' the fact that the hull blasted parcel is full o' coal, which has got to be haul'd off and tumbled into the river, to be got out of the way. I'm givin' ye the biggest kind of a bargain!"—*Wall Street Daily News.*

Wrecking a Farm.

A Honesdale, Pa., despatch of Dec. 11 says: "Two days ago, as a train of empty coal cars was going up a steep grade on the Jefferson Branch of the Erie, near Carbondale, it broke in two, and the detached section ran back down the grade. While going at a very high rate of speed, the cars jumped the track at a curve near the house of Thomas Quinn, a trackman, and ran directly toward it. Mrs. Quinn was at work in the kitchen, and her three children playing in a room above. The runaway cars laid low a fence and a summer house, struck Quinn's house near the centre and went right through it, passing Mrs. Quinn so closely as almost to touch her, and bringing the house in ruins about her. The three children tumbled down from the upper story to the ground with the ruins, and with their mother were held fast in the wreck, but were soon extricated, and received no serious injury. The runaway cars kept on their course for 100 yards further, demolishing a pigsty, in which three fat pigs were killed; a barn, in which a horse and a cow were crushed to death; a hen-house, in which 12 or more chickens were killed, and many rods of fence. The cars then brought up against a high bank, and were piled up in a complete wreck."

A Bold Train Robbery.

A dispatch from Fort Worth, Tex., Dec. 12, says: "A south-bound passenger train on the Fort Worth & Denver Railroad, while stopping at Bellevue yesterday morning for water, was boarded by three robbers, who took from the passengers 13 watches and $104 in money.

"The three robbers, who were unmasked and made no effort at concealment, arrived at the water tank a few minutes before the train. When the train arrived one of the robbers with drawn pistol ordered Engineer Ayres and his

fireman and O. G. Miller, another engineer who was riding in the cab, to alight, which they did. He then marched them some 30 ft. from the train and went through them, taking all the valuables they had. While this was going on the other two men went through the train. It appears that one of the passengers in the rear car, who was looking out of the window and saw the operation with the trainmen, divining the situation, went into the forward cars and notified the other passengers what was going on and told them to secrete their money. This they did in various ways, giving most of it and their diamonds to several ladies aboard. About $12,000 in money and $4,000 in diamonds and other valuables was left by the robbers in their haste to get through the train and because they did not search the ladies.

"They were evidently novices in the business, and went away with the paltry sum of $104 three gold watches, ten silver watches, five revolvers and one gold ring. The robbers left the train at the rear end of the sleeper, mounted horses standing near by, and rode rapidly away. The train was then hurried on to Bellevue, where telegrams were sent to Superintendent Frost at Fort Worth, who immediately replied, offering $250 reward for each robber, and in less than an hour five posses of officers and citizens were in pursuit."

Still Ahead.

A Boston man who was in London last fall was asked by a capitalist regarding the prospects of a certain railroad.

"No good—stock sells for about two cents on the dollar," was the reply.

"But I bought $20,000 on that account."

"You did?"

"Certainly. I bought at a cent and a half, and if it's up to two I'm a big lump ahead."—*Wall Street Daily News.*

TECHNICAL.

Locomotive Building.

The Brooks Locomotive Works in Dunkirk, N. Y., have taken an order for 4 Mogul freight locomotives for the Buffalo, Rochester & Pittsburgh road.

The Delaware, Lackawanna & Western shops at Kingston, Pa., are building several locomotives with the Wootten fire-box.

The Dickson Manufacturing Co., in Scranton, Pa., has taken an order for 15 locomotives for the Delaware & Hudson Canal Co. Five of them are to have Wootten fire-boxes.

The Car Shops.

The New York, Lake Erie & Western Co. has invited bids for 400 box, 400 stock and 400 coal cars for its New York, Pennsylvania & Ohio line.

The Kansas City Car & Car Wheel Co. has been organized with $100,000 capital stock, to build car shops and a wheel foundry at Rosedale, near Kansas City.

The New York, Ontario & Western shops at Middletown, N. Y., have begun to build 100 new stock cars for the road.

The New York Central & Hudson River Co. has ordered 1,000 new 20-ton box cars to be built at the East Buffalo shops.

The Wason Manufacturing Co. at Brightwood (Springfield), Mass., has taken a contract to build 15 passenger cars for the Boston & Maine road.

The Chicago & Alton shops at Bloomington, Ill., are building a number of stock cars for the road, 37 ft. in length.

The Central Vermont shops at St. Albans, Vt., have just completed a new baggage car for the road, which contains a compartment so arranged that it can be locked and sealed, for baggage going through to Canada in bond.

Harris & Co., In St. John, N. B., have taken a contract to build 76 box and 257 gondola cars for the Intercolonial road.

Bridge Notes.

The St. Louis Bridge & Iron Co. in St. Louis is building a highway bridge 175 ft. span for Lincoln County, Mo.; one of 180 ft. span and one of 110 ft. span in Jefferson County, Mo., and has also contract for a number of smaller bridges.

The Detroit Bridge Co. in Detroit, Mich., is putting up the new steel towers for the Niagara Suspension Bridge.

The Edge-Moor Iron Co., at Wilmington, Del., and Mr. Frederick H. Smith, of Baltimore, consulting engineer, have a number of contracts for iron bridges in the South, including one 840 ft. long, in 6 spans, over the Dan River in Danville, Va.; one 660 ft. long, in 7 spans, over the James River, for the Norfolk & Western road; one 1,125 ft., in 9 spans, over the Catawba River, on the Richmond & Danville, and 1,400 ft. of iron viaduct in Georgia, for the East Tennessee, Virginia & Georgia road.

The Union Bridge Co. has its shops in Buffalo very busy. The work on hand, besides that for the bridge over the Hudson River at Poughkeepsie, and for the Hawkesbury River bridge in Australia, includes 60 short spans for the St. Louis & San Francisco, 40 spans for the Illinois Central, 37 for the Canadian Pacific, 4 spans of 150 ft. each and one of 400 ft. for the Oregon Railway & Navigation Co., and the work on the new Union Pacific bridge over the Missouri River at Omaha. There are also 6 spans of 120 ft. each for the Union Pacific under way, and 3 spans of 200 ft. each for the Red River bridge on the St. Louis & San Francisco road. At the Athens, Pa., shops of the same company, a great deal of work is also being done, including 13 spans of 150 ft. each, for the Susquehanna River near Harrisburg, Pa.; 3 spans of 200 ft. each and one of 230 ft. for the Atchison, Topeka & Santa Fe, and a number of smaller bridges.

Manufacturing and Business.

The Western Iron Works Co. of St. Louis has received an order for a water tank of the Pope pattern from the New Jersey & New York Railroad, and has a number of other orders for the same tanks on hand.

The Wainwright Manufacturing Co. of Boston now manufactures corrugated copper and brass tubing in any gauge from No. 0 to No. 20. The corrugations in these tubes are spiral and not annular, and by the process adopted by this company the tubes are made of even thickness. This tubing is now coming into very extensive use.

Messrs. Jos. C. Poulterer & Co., iron merchants, have removed their offices to No. 216 South Fourth street, Philadelphia.

Iron and Steel.

The Baltimore & Ohio Rolling Mill Co. at Cumberland, Md., is now very busy, especially on plates and bridge iron.

The Laclede Rolling Mill in St. Louis has now several of its departments in operation, and is employing about one-half of the full force.

Secaucus Furnace, at Secaucus, N. J., is preparing to go into blast.

The Ohio Iron Co. at Zanesville, O., has completed the erection of a 10-ton open hearth steel plant, and has begun the manufacture of steel.

The Savage Drop & Forge Co. has decided to locate its works in Scranton, Pa., a considerable amount of stock having been taken in that place.

The Cherry Valley Iron Co. has put its furnace at Leetonia, O., out of blast for repairs.

The National Tube Works Co. at McKeesport, Pa., will erect 3 additional furnaces for the manufacture of steel.

The manufacturers of iron pipe in Pittsburgh and vicinity report large orders for iron pipes, chiefly for natural gas, but one large order has just been received from California for water pipe.

The Rail Market.

Steel Rails.—The market is very strong and an increase of prices is reported, quotations running from $35.50@$36.50 per ton at Eastern mills. A further increase is spoken of, and it is even predicted that prices will go to $40, but this seems hardly probable.

Rail Fastenings.—The market is active and quotations are steady at 2.40 cents per lb. for spikes in Pittsburgh; 2.90@3.10 for track-bolts and 1.85@1.95 for splice-bars.

Old Rails.—An active demand for old iron rails is reported and prices have gone up under the influence of a short supply. Sales are reported at $23@$24 per ton at tidewater, and $24.50 has been asked, but not paid. Old steel rails are also high and scarce, and are quoted at $24@$26 per ton in Pittsburgh.

The Tehuantepec Ship Railroad.

Mr. E. L. Corthell, Chief Engineer of the Tehuantepec Ship Railway, will address the Academy of Sciences at Columbia College, 49th street and Madison avenue, New York, on Monday evening, Dec. 20, at 8 o'clock, on the subject of the "Isthmian Ship Railway." A large map of the world, on canvas, and several interesting Canton views will be used to illustrate the subject. All interested are invited to attend.

Indurated Fibre Ware.

The Indurated Fibre Co., of Lockport, N. Y., is now engaged in the manufacture of pails, buckets and other ware from wood fibre or pulp by a new process. The wood, preferably spruce, although any soft, fibrous wood will answer, is first cleared of its bark and cut to a length uniform with the grindstone to be used, generally 16 to 24 in. It is then placed against the face of a rapidly revolving grindstone, the grain of the wood being in a line with or parallel with the axis of the stone and a hydraulic or worm-screw piston keeping the wood constantly pressed against the stone. The result, which is washed off the stone by a shower of water, after being screened of slivers and sawdust, is a milky-white liquid. With the water sufficiently extracted this is the wood pulp used in the manufactuer of paper and indurated fibre ware. The process of manufacture of ware from the pulp is exceedingly simple, and is similar in all the lines made by the company. In making a pail, for instance, the machine for first molding the pail from the pulp is provided with a hollow perforated form of cast-iron, shaped like the inside of a pail, and covered first with perforated brass and then with fine wire cloth. This form, worked by a hydraulic piston, is pushed up into a large cast-iron "hat," which fits over it very tightly. Within this hat is placed a flexible rubber bag and between this and the inner form first mentioned is admitted the pulp, still in a liquid state. The pulp being pumped in under pressure, the water immediately begins to drain off through the wire cloth and perforations, and the rubber bag swells until it fills the hat. The supply of pulp is then shut off, and water under high pressure is admitted within the hat and outside the rubber bag, thus squeezing much of the water from the pulp. After standing some 8 to 10 minutes the pressure is shut off, the inner form lowered and the pulp pail removed. At this stage the pail is still nearly 50 per cent. water, but is sufficiently strong to allow handling. This water is first all dried out in dry kilns, and then the pail is turned off on the outside with a gang of saws. After sandpapering inside and out the pail is ready for the treatment-house. With reference to the treatments in which it is soaked, the company states that they are entirely harmless, especial attention being called to the fact that they permeate thoroughly the material of which the pail is made. Baking in ovens at a high temperature succeeds each dip or treatment. The polish which the goods present is described as being the result of the final treatment, in which the pail is baked at a temperature of 280° F. After this the handles are riveted on the goods, which are then ready for the market.

In making buckets or other goods it is to be noted that the name or mark of a railroad can be stenciled and baked in during the process, so that it is impossible to erase or remove it.

This ware, it is claimed, is entirely impervious to the action of any liquids which may be put in it. So confident is the company on this point, that it is proposed to make barrels of the indurated fibre and ship kerosene oil to France in them. The *same barrels* are then to be returned to this country filled with wine, after receiving a cleaning, which will, it is expected, fit them for the purpose, even the penetrating odor of petroleum being unable to pass through or soak into the barrels.

Some recent tests of the indurated fibre made in connection with the electric subways in New York gave 11,513 lbs., 14,659 lbs. and 16,422 lbs. tensile strength per square inch.

Pails made from the indurated fibre present an excellent appearance; they are much lighter than an ordinary pail, and having no hoops or joints cannot break up or shrink when left dry.

The Indurated Fibre Co. has recently filled orders for the Chicago & Alton, the Old Colony Steamboat Co. and the Union Pacific Railroad.

Car Links and Pins.

A new machine to make railroad car coupling pins is in successful operation at the Pittsburgh Forge & Iron Works, by which 35 pins can be made in a minute. One thousand pins made in the old way was considered a big day's work. In a day's work of 10 hours the machine can turn out at least 15,000 pins. A machine for making car links is soon to be put up; this is to turn out about 25 links to the minute. The process is precisely the same.—*American Manufacturer, Pittsburgh.*

Engineers' Club of Philadelphia.

A regular business meeting of the Club was held in Philadelphia Dec. 14, President Washington Jones in the chair, and 24 members present. Nominations were submitted for officers to serve during the ensuing year.

Mr. Carl Hering read a paper upon analogies between electrical and mechanical units and phenomena.

The Secretary presented for Mr. A. H. Howland a paper upon the subject of water pipes, in which he discussed at considerable length the relative merits of cast-iron, cement-lined, wrought-iron, earthenware, composition and glass pipes. This paper was discussed by Professor Haupt and Messrs. Hoyt, Thompson and Howard Murphy.

The Secretary presented for Mr. Rudolph Hering notes upon the present investigation of the drainage and water supply of Chicago.

The Secretary announced the death on Nov. 6 last, of Mr. William Brantley Cooper, an active member of the Club, and read a short account of his life and works. The Club then adjourned.

Heating Cars by Steam on the Connecticut River Railroad.

The *Springfield Republican* gives the following details of the experiments in progress on the above road:

"The experiment made by James Emerson, of Williamsett, in heating cars by steam, which has been in progress for some three winters on the Connecticut River Railroad, has reached the stage where the officers and employés of the road pronounce it successful. The demand for cars warmed without the chance of fire in case of accident is enforced by the repetition of such calamities as those at Bardwell's and Rio, and the effort to meet it is not new. The two conspicuous examples in this region are the Emerson system, which has been developed on the Connecticut River road, and the Martin anti-fire system, which hails from Dunkirk, N. Y., and is used on some of the Boston & Albany trains. The objection was raised that heat depending upon the engine boiler would be worthless in snow blockades, in which the engine frequently becomes separated from the cars, and the officers of the road insisted that the steam from the boiler must be supplemented by a furnace of some sort connected with each car for use in emergencies. Mr. Emerson has been working upon this part of the problem ever since, and now has solved it to his satisfaction.

"The pipes are supplied directly from the engine boiler. They go up one side of the car and down the other, the connections between the cars being by pipes of corrugated rubber, and the steam passing out of and returning to the engine by the same circulating system used in warming houses. This method of heating is in use upon all the local trains of the Connecticut River road. The supplementary furnace is not in such general use, being confined to one train. Boilers of some sort have been used upon it for about a year. It is not unlike a miniature locomotive boiler, having a fire-box 12 in. square and a boiler running along under one side of the car, holding about 35 gallons of water. The whole hangs some 22 in. below the floor of the car, considerably higher than the brake-beams, so that it is out of the reach of injury from obstacles upon the track. The boiler connects with the same set of pipes used in heating the car from the engine, the condensed steam dripping back into the boiler and preventing the supply of water from running suddenly short.

"The chief objection to the steam was that it kept the car too hot, and Mr. Emerson has arranged a circulating system of pipes upon the roof of the car. When the temperature is too high the steam is turned into these pipes by a valve operated from the inside of the car. Another valve turns the dripping from the pipes back into the boiler. In the middle of the car is a small trap-door, which, when raised, discloses a lever by which the draft of the furnace may be opened or closed. Beside the pipes about under the car seats a pipe runs directly through underneath the car by which steam from the engine may be sent to a car in the rear without warming the car in front. Little trap doors at the ends of the cars disclose valves which control the entrance of the steam to these pipes. At the front of the car is a small gauge indicating the pressure."

Blast Furnaces of the United States.

The *American Manufacturer* (Pittsburgh) says: "Our usual monthly report of the blast furnaces of the United States, giving the condition of all the furnaces of the country Dec. 1, shows no material changes since the date of our last report, Nov. 1. There are more furnaces in blast, but no important change in capacity, except in the case of the charcoal furnaces, which show an increase of some 13 per cent. in capacity of those blowing. There is a change of but 37 tons in the capacity of the anthracite furnaces in blast, and of but 543 tons in the capacity of the bituminous furnaces.

"In a condensed form, the table makes the following showing:

	In blast.		Out of blast.	
Fuel.	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal	67	11,818	109	12,543
Anthracite	115	32,634	88	21,082
Bituminous	141	78,832	68	30,125
Total	323	123,284	265	63,710

"Though there has been but little change in the aggregate, there have been some changes in the sub-districts. There are 2 less charcoal furnaces in blast in Pennsylvania and 1 less in the Hanging Rock Region of Kentucky, a total of 3 less. On the other hand, there has been an additional charcoal furnace blown in in New England, 1 in Virginia, 2 in the Ohio Hanging Rock Region, 2 in Tennessee, 1 in Alabama, and 1 in Washington Territory, a total of 8, which gives, by substracting those out, the increase of 5 charcoal furnaces in blast.

"In the anthracite region there is 1 additional furnace in the Lehigh Valley, 3 in the Schuylkill and 1 in Maryland, or 5 additional in blast. On the other hand, there is one less in blast in the Lower Susquehanna Valley, which, with the spiegel furnace out in the Lehigh Valley, makes 2 less in. This, substracted from the 5 additional in, gives the difference between the reports of November and December.

"The changes by districts of bituminous furnaces are as follows: Increase of furnaces in Upper Susquehanna Valley Pittsburgh, Youghiogheny Valley, Virginia, Mahoning Valley and Alabama, 1 each; total, 6. Decrease in furnaces in blast: Ohio 2, Georgia 1; total, 3. Making a total increase of furnaces in blast 3.

"The production during the past two months has not been up to the usual mark, by reason of a difficulty in getting coke supplies, there having been a 'car famine.' This is nearly removed, and the production of December bids fair to reach the usual average.

"As compared with one year ago the increase in number of furnaces in blast and consequent production has been very great, as will be seen from the following comparative table:

	Dec. 1, 1885.		Dec. 1, 1886.	
Fuel.	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal	61	8,360	67	11,818
Anthracite	94	26,816	115	32,634
Bituminous	99	49,790	141	78,832
Total	254	84,966	323	123,284

"Though it was about a year ago that the increased activity in the production of pig iron became manifest, December, 1885, showing a most decided increase in capacity in blast over November of the same year, the capacity of furnaces in blast December, 1886, as compared with December, 1885, still shows a most decided increase. The capacity of charcoal furnaces in blast Dec. 1, 1886, is 41 per cent. greater than at the same date of 1885; of anthracite 22 per cent. greater, and of bituminous 60 per cent. greater."

The Gold System of Heating Cars.

The Edward E. Gold system of heating cars, recently illustrated in the *Railroad Gazette*, has been adopted by the Providence, Warren & Bristol, and the Long Island railroads. The cars are heated by steam from the locomotive, and sufficient heat is stored in each car to maintain its temperature for two hours after being detached from the locomotive. It is by means of this method of storing heat in the cars that the cable cars of the North Hudson County railroad, at Hoboken, N. J., are heated by the Gold system.

The Westinghouse Engine.

The Philadelphia *Public Ledger* is replacing its present motive power with a series of independent engines. The Westinghouse engine has been selected, and three will be coupled direct to the presses. Another will drive the electric light plant and one the ventilating fans.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Central, of Georgia, annual meeting, at the Banking House in Savanah, Ga., at 10 a. m., on Dec. 22; annual election, at the same place, at 10 a. m. on Jan. 3.

Cincinnati, Hamilton & Dayton, special meeting, at the office in Cincinnati, O., Jan. 5.

Columbus, Hocking Valley & Toledo, annual meeting, at the office in Columbus, O., at 10 a. m. on Jan. 11.

Illinois Central, special meeting, at the office in Chicago, at 11 a. m. on Jan. 18.

Milwaukee & Northern, special meeting, in Milwaukee, Wis., Jan. 6.

Peoria, Decatur & Evansville, special meeting, in Peoria, Ill., Dec. 20.

Providence & Worcester, annual meeting, at the office in Providence, R. I., at 10 a. m. on Feb. 7.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston, Revere Beach & Lynn. 3 per cent., semi-annual, payable Jan. 1.

Connecticut River, 2 per cent., quarterly, payable Jan. 1, to stockholders of record on Dec. 16.

Lehigh Valley, 1 per cent., quarterly, payable Jan. 15, to stockholders of record on Dec. 18.

Manhattan, 1¼ per cent., quarterly, payable Jan. 3, to stockholders of record on Dec. 18.

Missouri Pacific, 1¾ per cent., quarterly, payable Jan. 3.

Northern Central, 4 per cent., semi-annual, payable Jan. 15, to stockholders of record on Dec. 31

Norwich & Worcester, 4 per cent., semi-annual, payable Jan. 10, to stockholders of record on Dec. 31.

Oregon Railway & Navigation Co., 1½ per cent., quarterly, payable Jan. 1, to stockholders of record on Dec. 20.

Richmond & Petersburg, 3 per cent., semi-annual, payable Jan. 10. This company increases from 2½ to 3 per cent.

Foreclosure Sales.

The *Lake Erie & Western* road was sold under foreclosure Dec. 13, the United States Circuit Court having refused a further postponement. The LaFayette, Bloomington & Muncie section brought $3,145,000; the Eastern Division, $2,150,000 and the Sandusky Division, $445,000. All three divisions were bought by Calvin S. Price, of Lima, O., and Samuel Thomas, of New York. They formerly owned a large interest in the road, and are now understood to represent the holders of the junior securities.

The *Little Rock, Mississippi River & Texas* road was sold under foreclosure in Little Rock, Ark., Dec. 15, and bought for $50,000 by John Rose. The purchase was made for account of Jay Gould, who now owns a majority of the bonds.

Western Association of General Passenger and Ticket Agents.

The annual meeting of this Association was held in St. Louis Dec. 8. Officers were elected for the ensuing year and some routine business transacted, but nothing of general interest was done.

Cleveland, Columbus, Cincinnati & Indianapolis Mutual Benefit Association.

This association held its annual meeting in Dayton, O., Dec. 8, with a full attendance. The report of the officers showed that there are now 1,180 members. During the year there were 21 deaths, and payments amounted to $21,013, leaving a balance of $1,027 in the treasury. The total payments since the organization of the association have been $302,222. It was decided to hold the next meeting in Cleveland.

ELECTIONS AND APPOINTMENTS.

Atlantic & Danville.—At the annual meeting in Norfolk, Va., Dec. 14, the following directors were chosen: Benjamin D. Tiller, Hicksford, Va.; N. Burruss, Norfolk, Va.; F. J. Pater, St. Louis; Thomas A. Ewing, R. A. Ellner, New York. The board elected Benjamin D. Tiller, President; Thomas A. Ewing, Vice-President,

Baltimore & Ohio.—The board of directors has re-elected Robert Garrett President of the company for the ensuing year.

Baltimore & Philadelphia.—This company, which is controlled by the Baltimore & Ohio, has elected James B. Washington President; Samuel Spencer, Vice-President; John C. Farra, Secretary; W. H. Ijams, Treasurer; W. T. Thelin, Auditor; Thomas M. King, Managing Director.

Chicago, Burlington & Northern.—Mr. T. J. Shepard is appointed Special Agent of the Passenger Department, with headquarters at St. Paul, Minn. Mr. T. J. McElroy is appointed Traveling Passenger Agent, with headquarters at La Crosse, Wisconsin.

Chicago, Milwaukee & St. Paul.—The following circular is issued by General Freight Agent Bird, dated Milwaukee, Dec. 1: "Mr. J. Chapman having resigned the position of Division Freight Agent, the following appointments and changes will take effect this date: Mr. G. F. White is appointed Division Freight Agent, with headquarters at Davenport, Ia., and in addition to his present duties will have immediate charge of freight traffic at stations on the Dubuque Division south of and including North McGregor. The territory of M. B. H. Langley, Division Freight Agent, Winona, Minn., has been extended to cover stations on the Dubuque north of North McGregor."

Chicago, Santa Fe & California.—The directors are: Charles S. Holt, Abraham Poole, John L. Thompson, A. D. Wheeler and Norman Williams, all of Chicago.

Cincinnati, Wabash & Michigan.—Mr. George A. Cartwright is appointed General Freight and Passenger Agent, with office at Elkhart, Ind., in place of Owen Rice, resigned.

Cleveland, Columbus, Cincinnati & Indianapolis.—Mr. A. P. Lincoln is appointed Paymaster in place of Mr. E. C. Sheldon, who has gone to the Lake Shore road.

Cleveland, Columbus, Cincinnati & Indianapolis Mutual Benefit Association.—This Association has elected the following officers for the ensuing year: President, Robert Blees; First Vice-President, C. Potter; Second Vice-President, Paul Quigley; Secretary, G. W. Burt; Treasurer, T. J. Higgins; Auditor, D. M. Easson; Executive Committee, H. M. Townsend, Joseph Miller, Knox Platt, L. H. York, W. G. Knight, E. A. Peck, A. B. Quigley, John Lane and W. P. Johnson.

Colusa & Lake.—The officers of this company as consolidated are: President, W. P. Harrington; Vice-President, E. W. Jones; Secretary, C. M. Ballantine; General Superintendent, E. A. Harrington.

Fort Worth & Denver City.—At the annual meeting in Forth Worth, Tex., Dec. 14, the following directors were elected: Morgan Jones, J. Peter Smith, F. W. Pearsall, William M. Harrison, J. M. Brown, Isaac Dahlman, J. F. Granger, A. J. Mayer, and W. F. Waters. Morgan Jones was elected President; F. W. Pearsall, Vice-President; W. A. Ross, Secretary; J. F. Granger, Treasurer.

Genesee Valley Terminal.—At the annual meeting in Rochester, N. Y., Dec. 8, this company elected directors as follows: G. Clinton Gardner, A. N. Martin, C. H. Clark, C. H. Allen, B. K. Jamison, Bryce Gray, E. W. Clark, E. L. Owen, I. N. Seligman, B. C. Rumsey, E. F. Winslow, P. P. Pratt, John Dougherty. The company is controlled by the Buffalo, New York & Philadelphia.

Georgia, Carolina & Northern.—This company was organized at Athens, Ga., Dec. 9, by the election of the following directors: R. F. Hoke, Raleigh, N. C.; L. W. Perrien, Abbeville, S. C.; A. Hull, A. Hodgson, Athens, Ga.; C. A. Collier, R. J. Lowry, Hoke Smith, Atlanta, Ga. The board elected R. F. Hoke President; A. L. Hull, Secretary and Treasurer.

Gulf, Houston & Rio Grande.—The directors of this new company are: Abram Cross, J. L. Mitchell, S. Packard, Prosper W. Smith, Houston, Tex.; John B. Alley, Lynn, Mass.; Josiah C. Reiff, New York.

Hannibal & St. Joseph.—Mr. W. F. Merrill, late Superintendent of the Iowa lines of the Chicago Burlington & Quincy, has been appointed General Manager of the road to succeed Mr. J. F. Barnard, who has gone to the Ohio & Mississippi.

Indiana, Illinois & Iowa.—President F. M. Drake gives notice that Mr. T. P. Shonts is appointed General Manager of this company. Appointment took effect Dec. 6.

Kansas City, St. Joseph & Council Bluffs.—Mr. W. F. Merrill is appointed General Manager in place of Mr. J. F. Barnard, who recently went to the Ohio & Mississippi.

Kansas, Nebraska & Dakota.—At the annual meeting in Topeka, Kan., Nov. 27, the following officers were chosen: President and Treasurer, John Francis, Topeka, Kan.; Vice-President, A. A. Harris, Fort Scott, Kan.; Secretary, J. G. Stonecker, Topeka, Kansas.

Kanawha & Ohio.—The following circular has been issued by General Manager Thomas R. Sharp: "Mr. J. E. Story, General Freight and Passenger Agent, having resigned, Mr. G. J. Ermlich has been appointed to succeed him, with office at Charleston, W. Va. The office of Master of Transportation has been abolished. All communications regarding the business of the transportation department will in future be addressed to the General Manager. Mr. A. Wilson, General Agent, Point Pleasant, W. Va., has resigned, and the office has been abolished."

Keokuk & Western.—The following circular is issued by the President, Mr. F. T. Hughes, dated Keokuk, Ia., Dec. 3: "This company having acquired the ownership and control of the Missouri, Iowa & Nebraska Railway, will hereafter manage and operate the same. Mr. H. F. Clark has been appointed General Manager. All officers and employés will obey his instructions, and all reports will be made to him at his office in this city."

Mr. Clark issued the following on the same date: "I have appointed Mr. J. F. Howell Assistant Treasurer, Auditor and Paymaster of this company, taking effect to-day, and his instructions as such will be obeyed. The office of General Freight and Passenger Agent is hereby abolished, and all communications relating to traffic should be addressed to the General Manager. The heads of other departments will remain unchanged."

Lake Erie & Western.—Mr. C. R. Cummings has been chosen President in place of E. H. R. Lyman, resigned, and Mr. F. C. Hollins Vice-President in place of A. M. White, resignod.

Lake Shore & Michigan Southern.—Mr. Edward C. Sheldon is appointed Cashier to succeed his father, Edward Sheldon, whose death was lately noted.

Lehigh & Hudson River.—At the annual meeting, Dec. 9, the following directors were chosen: Grinnell Burt, George W. Sanford, W. C. Sheldon, John S. Martin, F. A. Potts, G. A. Hobart, James B. Titman, Edward W. Clark, Joseph S. Harris, Francis C. Yarnall, H. P. Marsh, R. P. Davis and W. P. Potts. Messrs. Marsh and Davis succeed Messrs. F. R. Cope and Edward Loomis. The board elected Grinnell Burt President; Joseph S. Harris, Vice-President; D. B. Halstead, Secretary; John Sayer, Treasurer.

Leroy & Eastern.—The directors are: John Dunn, Hyde Park, Ill.; Thomas E. King, Michael C. Markham, Lewis T. Moore, Joseph C. Russ, Chicago.

Maine Central.—At the annual meeting in Portland, Me., Dec. 15, the following directors were chosen: Arthur Sewall, George C. Lord, Amos Paul, Wm. G. Davis, Frank Jones, S. C. Lawrence, John Ware, H. N. Jose, Nathaniel J. Bradlee, Darius Alden, J. J. Ricker, Thomas W. Hyde, Francis W. Hill. The board elected Arthur Sewall President; Josiah H. Drummond, Clerk.

Mankato & Albert Lea.—The incorporators are: Frank Hall, Wm. P. Sargeant, Robert M. Todd, Albert Lea, Minn.; Charles Cunningham, Fletcher D. Scanlan, Ozias P. Smith, Alma, Minn.; Henry Foster, Daniel F. Rasdall, St. Clair, Minn.; M. D. Collester, Lester Patterson, John A. Willard, Mankato, Minnesota.

Milwaukee, Lake Shore & Western.—General Manager H. F. Whitcomb announces that Mr. C. F. Rand having resigned the office of Auditor to engage in other business, the duties of the position will, until further notice, be performed by Mr. P. M. Halloran, Chief Clerk, with the title of Acting Auditor.

Milwaukee & Northern.—Mr. J. C. Forester is appointed General Freight Agent, in place of Mr. J. J. Coleman, resigned. Appointment took effect Dec. 1.

Mobile & Ohio.—The following circular has been issued by Traffic Manager H. S. Depew: "The office of General Freight Agent having been abolished, the duties of that department will be assumed by the Traffic Manager from Dec. 1, and from this date all communications relating to freight traffic, rates, claims for loss, damage and overcharge should be addressed to him in St. Louis. Mr. Sumner Hopkins having been appointed General Western Agent, with headquarters at Kansas City, taking effect Dec. 1, his jurisdiction will embrace the territory north of the Ohio and west of the Mississippi rivers. He is authorized to contract for south-bound traffic and perform such other duties in connection with the freight department as may be assigned to him. Mr. J. T. Poe having been appointed General Southern Agent, with headquarters at Mobile, Ala., taking effect Dec. 1, his jurisdiction will embrace the territory south of the Ohio and east of the Mississippi rivers. He is authorized to contract for north bound traffic and perform such other duties in connection with the freight department as may be assigned to him."

New York & New England.—At the annual meeting in Boston, Dec. 14, an almost entirely new board was chosen, as follows: Eustace C. Fitz, Jonas H. French, Stanton Blake, Boston; George M. Rice, Worcester, Mass; Nicholas Sheldon, B. F. Vaughan, Providence, R. I.; Frederick J. Kingsbury, Waterbury, Conn.; W. H. Stevenson, Bridgeport, Conn.; A. E. Bateman, J. A. Bostwick, Vernon H. Brown, Heman Clark, John L. Macauley, John G. Moore, H. V. Newcombe, T. W. Pearsall, Elijah Smith, W. H. Starbuck, F. D. Tappen, New York. Messrs. Blake, Fitz, Rice and Kingsbury are the only directors re-elected. The new board is in the New York interest as opposed to the old or Boston management. The board elected J. A. Bostwick President; J. W. Perkins, Secretary and Assistant to the President.

New York, New Haven & Hartford.—At the annual meeting in New Haven, Dec. 15, the following directors were chosen: Charles P. Clark, Boston; Henry C. Robinson, Hartford, Conn.; George H. Watrous, E. M. Reed, E. H. Trowbridge, New Haven, Conn.; Wm. D. Bishop, Nathaniel Wheeler, Bridgeport, Conn.; Wilson G. Hunt, George M. Miller, A. R. Van Nest, Chauncey M. Depew, Joseph Park, C. M. Pond, New York.

New York, Providence & Boston.—At the annual meeting in Providence, Dec. 8, the old directors were re-elected, as follows: Robert Knight, B. N. Lapham, Providence, R. I.; Henry Howard, Coventry, R. I.; Nathan F. Dixon, Westerly, R. I.; George Peabody Wetmore, Newport, R. I.; Henry C. Robinson, Hartford, Conn.; Samuel D. Babcock, Wm. P. Dixon, James Boorman Johnston, George M. Miller, John L. Riker, New York.

North Platte, Lakin & Tascosa.—The directors of this new company are: W. T. Bartell, A. B. Boylan, H. M. Carr, J. J. Coram, A. J. Devers, F. P. Lindsay, John O'Louglin, B. C. Parcell, Lakin, Kan.; J. Wilkes Ford, Chicago.

Potomac, Fredericksburg & Priedmont.—General Manager W. H. Richards announces that Mr. W. P. Johnson has been appointed Master of Motive Power in place of W. J. Sweigard, resigned.

Richmond & Danville.—The following directors have been chosen to fill vacancies made by resignation. Alfred Sully, Emanuel Lehman, J. A. Rutherford, T. M. Logan, James B. Pace, E. M. Rice. The new directors represent the new owners of the road.

Rhode Island & Massachusetts.—This company, whose road is leased to the New York & New England Co., held its annual meeting in Providence, R. I., Dec. 8, and re-elected the old officers and directors.

St. Louis, Alton & Terre Haute.—This company having assumed charge of the St. Louis Southern (formerly the St. Louis Coal) road under a contract, that line will be known as the Marion Division. A circular from Vice-President George W. Parker says: "The following officers, in their respective departments, will at once assume charge of the details of business on that division, viz.: W. S. Wilson, Superintendent; B. F. Blue, General Freight and Passenger Agent; H. T. Nash, Auditor and Paymaster; P. H. Murphy, Master Mechanic; Henry Mason, Roadmaster."

St. Louis & Central Illinois.—The following circular from General Manager H. A. Fisher is dated St. Louis, Mo., Dec. 1: "Wm. H. Hartman is appointed Superintendent; also in charge of machinery, road department and car service, with office at Jerseyville, Ill. W. R. Church is appointed General Freight and Ticket Agent; also in charge of accounting department, with office at Jerseyville, Ill. Both appointments to take effect this day."

St. Paul, Minneapolis & Manitoba.—Mr. George E. Allen has been appointed General Agent in Chicago, to date from Jan. 1. Mr. Allen was a former newspaper man and was for several years one of the owners of the *Bradford (Pa.) Star*. He founded the *Railway Magazine* in Buffalo and conducted it for a year, or until a few months ago, when he was appointed City Passenger Agent of the Erie in Buffalo. Mr. Allen is a very energetic man, and has made many friends.

Tavares, Orlando & Atlantic.—Mr. C. A. Baird has been appointed General Freight and Passenger Agent of this road, with headquarters at Orlando, Florida.

Texas & Pacific.—Mr. John A. Grant has been appointed General Manager in place of George Noble, deceased. Mr. Grant was recently on the Louisville, New Orleans & Texas road.

Union Pacific.—Mr. Jacob Blickensderfer, for many years Chief Engineer, has been relieved of his more active duties, but will retain the supervision of all the engineering work of the company, with the title of Consulting Engineer.

Mr. Virgil H. Bogue has been appointed Chief Engineer. Mr. Bogue has been connected with the Northern Pacific for several years and was recently Principal Assistant Engineer of that road.

Vermont Railroad Commission.—The new Railroad Commissioners of Vermont have elected Ex-Gov. Samuel E. Pingree Chairman; Alfred E. Watson, Clerk.

Virginia Midland.—Mr. Thomas M. Logan has been chosen President in place of H. M. Huidekoper.

Western Association of General Passenger and Ticket Agents.—At the annual meeting in St. Louis, Dec. 8, the following officers were chosen: President, H. M. Bronson, Indiana, Bloomington & Western; Vice-President, J. S. Lazarus, Indianapolis, Decatur & Springfield; Secretary, J. E. Hannegan, Burlington, Cedar Rapids & Northern.

PERSONAL.

—Mr. W. J. Sweigard has resigned his position as Master of Motive Power of the Potomac, Fredericksburg & Piedmont road.

—Mr. E. D. Frost has resigned his position as General Superintendent of the Natchez, Jackson & Columbus road, to take effect Jan. 1 next.

—Mr. Virgil G. Bogue, Principal Assistant Engineer of the Northern Pacific Railroad, has resigned that position to accept a similar office on the Union Pacific.

—Mr. E. H. R. Lyman has resigned his position as President of the Lake Erie & Western Railroad Co., and Mr. A. M. White has also resigned his position as Vice-President.

—Mr. Owen Wright has resigned his position as general freight and passenger agent of the Cincinnati, Wabash & Michigan road. He has been connected with that company for 13 years past.

—Mr. David P. Tripp died at his residence in Waterloo, Ill., Dec. 7, aged 56 years. He was a lawyer and was President of the St. Louis & Chester Railroad Co., which has under construction a line from St. Louis to Carbondale.

—It is reported that Mr. Lucius Tuttle, General Passenger Agent of the Boston & Lowell, and formerly of the Eastern Railroad, has been offered a similar position with the

Canadian Pacific. If Mr. Tuttle accepts, his future residence will be in Montreal.

—Colonel Samuel Hambleton, who died at his residence in Easton, Md., Dec. 9, aged 74 years, was for many years a prominent lawyer of the Western Shore, of Maryland. He served several terms in the Maryland Legislature. He was for several years President of the Chesapeake & Ohio Canal Co., and held other offices of trust.

—A Dubuque, Ia., dispatch of Dec. 11 announces the death of Mr. David Coleman. Mr. Coleman had had extensive experience in the construction and management of railroads. He was Superintendent of Construction of the Chicago, Burlington & Northern road, and on its completion was appointed Superintendent of the Northern Division of the road.

—Mr. Charles P. Clark retires this week from his long connection with the New York & New England road as Vice-President, Receiver and President, the opposition or New York party having been successful. It is reported that the new management will offer Mr. Clark the position of General Manager of the road, but it is not certain that he will accept the offer, if it is made.

—Mr. J. A. Bostwick, the new President of the New York & New England Co., is a man of large wealth. He has been for a number of years a director of the Standard Oil Co., and was for a time its Treasurer. He has not, until recently, been interested in railroad property, but is said to be the chief owner of the projected New York, Danbury & Boston line, and also to be the chief stockholder of the New York, Rutland & Montreal, formerly the Lebanon Springs road.

—A report comes from Washington to the effect that Mr. E. B. Thomas has tendered his resignation as General Manager of the Richmond & Danville road and that he has been offered and will accept the position of President of the Cleveland, Columbus, Cincinnati & Indianapolis Co., which has been vacant since the death of General Devereux. Mr. Thomas was for many years connected with the Bee Line and was General Manager of that road when he left to go to the Richmond & Danville.

—Col. James Boon, formerly an extensive railroad contractor, died at his residence in Lancaster, Pa., Dec. 13, aged 83 years. He was a native of Ireland, and came to this country when a youth. He learned pattern-making in Wilmington, and was largely engaged in the railroad and iron business, amassing a large fortune. He was the oldest Odd Fellow in Pennsylvania, as is shown by the official record. His only son, Mr. James M. Boon, is Superintendent of Motive Power of the West Shore road, and was formerly on the Pittsburgh, Fort Wayne & Chicago.

—At the regular meeting of the New England Railroad Club, in Boston, last week, the following resolutions were presented by a committee consisting of Messrs. J. W. Marden, F. D. Adams and J. T. Leighton, and were unanimously adopted:

"*Whereas*, This Club has learned with the sincerest regret of the death of their late lamented friend, Leander Garey, who was among the oldest and most honored of its associates, and to whose zeal and perseverance the formation and success of the Master Car-Builders' Association is largely due, who was for many years the leader in all of the improvements that were submitted to the action of that body, and

"*Whereas*, We honored him not only as a man and a useful member of the Car-Builders' Association, but because in addition, he gained our affections by the uprightness with which he carried himself under all circumstances, and his uniform kindness toward all who were brought in contact with him, and the assistance that he was always more than ready to give to those who came to him for guidance and advice; therefore, be it

"*Resolved*, That this Club and the railroad fraternity have lost a valued friend, and one whose influence will long be felt, and that we hereby present to the bereaved family and friends our heartfelt sympathy in their affliction, and assure them that their grief will be our own, and

"*Resolved*, That the Secretary be instructed to spread these resolutions upon the minutes of the meeting, and have a copy engrossed and sent to the bereaved family."

TRAFFIC AND EARNINGS.

Cotton.

Cotton movement for the week ending Dec. 10 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	144,920	187,705	D. 42,785	22 8
Shipments	133,667	135,989	D. 2,322	1.7
Stock, Dec. 10	402,085	434,343	D. 32,258	7.4
Seaports:				
Receipts	227,886	248,134	D. 20,248	8.2
Exports	190,881	179,942	I. 10,939	6.1
Stock, Dec. 10	1,006,304	951,288	I. 55,016	5.4

Stormy weather interfered with the interior movement during the week. The total shipments from plantations for the crop year to Dec. 10 are estimated at 3,721,867 bales, against 3,764,843 last year, 3,695,299 in 1884 and 3,676,273 in 1883.

Saginaw Lumber Shipments.

Shipments of lumber by lake from East Saginaw and Bay City have been for ten successive years, in *millions* of feet:

1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
539.9	525.3	678.3	709 6	833.1	858.3	778.7	734.9	659.7	519.0

The shipments by rail may have increased of late years, but the total production has decreased.

Traffic Notes.

A meeting of the general passenger and ticket agents of all lines in the territory of the late Central Passenger Committee was to be held in Chicago on Thursday, Dec. 16, to consider the feasibility of putting the agreement of the proposed Interior Passenger Committee into effect Jan. 1 next.

A meeting of general passenger agents was held in Springfield, Mass., Dec. 10, to revise the north and south-bound rates which will be affected by the New York, New Haven & Hartford Co.'s reduction of passenger fares to 2 cents a mile, which takes effect Jan. 1.

During the month of November the earnings on business in the Southwestern Railway Association amounted to $858,392, while from Jan. 1 to Nov. 30 the earnings were $9,364,187. The net decrease for the first eleven months of the year, as compared with the earnings of the corresponding period of 1885, amounted to $445,308. The earnings of the lumber pool, which are included in the above, amounted to $1,503,928 during the eleven months an increase of $178,502.

Wichita Pool.

A meeting of the general freight agents of the Southern Kansas roads (Wichita pool) at Kansas City, Dec. 10, ordered an immediate restoration of freight rates to the latest recognized tariffs, with the privilege of reverting to the new rates under the late decision of the arbitrators, when arrangements are perfected. It will probably be a week or so before the differentials awarded by the arbitrators can be put in effect.

Mr. C. L. Wellington has been selected as Commissioner.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Eleven months to Nov. 30:				
Canadian Pacific	$9,187,416	$7,637,283	I. $1,550,133	20.3
Cin., R. & Ft. W.	348,956	342,913	I. 6,043	1.8
Col. & Cin. Mid.	290,506	187,471	I. 103,035	54.9
Col., H.Vy. & Tol.	2,208,470	2,101,588	I. 106,882	5.1
E. Ten., Va. & G.	3,826,564	3,711,883	I. 144,681	3.9
Ev. & Terre H.	688,512	670,078	I. 18,434	2.8
Flint & Pere Mar.	1,958,324	1,769,199	I. 189,125	10.7
Grand Rap. & I.	1,801,124	1,795,551	I. 95,573	5.3
Grand Trunk	15,386,625	13,585,687	I. 1,800 938	13.2
Gulf, Col. & S. F.	2,053,308	1,648,697	I. 404,611	24.5
Illinois Central:				
Ill. lines	6,045,807	5,934,512	I. 111,295	1.7
So. Division	3,537,843	3,881,955	D. 344,112	8.8
Iowa lines	1,573,052	1,517,655	I. 55,395	3.6
Ind., Dec. & Spr.	388,300	337,245	I. 51,055	15 4
K. C., Clint. & S.	218,504	.....	.....	....
K. C., Ft. S. & G.	2,305,457	2,343,089	D. 38,532	1.6
K. C., Spr. & M.	1,297,619	1,379 682	D. 82,063	5.9
Lake Erie & W.	1,164,222	1,072,433	I. 91,889	8.6
Lehigh & H. R.	196,391	161,429	I. 34,962	21.7
Lou., Ev. & St. L.	785,286	652,289	I. 132,997	20.4
L., N. O. & Tex.	1,508,354	1,146,592	I. 361,762	31.5
Marq., H. & Ont.	951,282	795,796	I. 155,486	19.5
Mem. & Charles.	1,266,500	1,180,886	I. 85,614	7.3
Mexican Cen.	3,414,231	3,212,864	I. 201,367	6.3
Mich. & Ohio	203,732	168,441	I. 35,291	21.0
Minn. & N. W.	443,303	.....	.....	....
N. Y. Cen. & H. R.	29,705,952	22,185,691	I. 7,520,261	33.9
N. Y. City & No.	501,417	413,377	I. 88,040	21.3
Oreg. R. & N.	4,930,281	4,610,288	I. 319,993	6.9
Net earnings	2,218,327	2,111,062	I. 107,265	5.1
St. L., A. & T. H.:				
Main Line	1,154,616	1,156,762	D. 2,146	0.2
Belleville Line	713,609	694,032	I. 19,577	2.8
Staten Island	754,929	627,987	I. 126,942	20.2
Texas & Pacific	5,290 133	4,973,247	I. 316,886	6.4
Valley (Ohio)	561,576	.....	.....	....
Wisconsin Cent.	1,395,776	1,343,016	I. 52,760	3.9
Min., S. C. & W.	282,523	164,293	I. 98,230	59.8
Wis. & Minn.	298,014	143,009	I. 155,005	108.4
Ten months to Oct. 31:				
Des. M. & Ft. D.	$274,796	$309,115	D. 34,319	11.1
Net earnings	62,824	87,617	D. 24,793	28.2
Det., B. C & Al.	188,673	.....	.....	....
Net earnings	101,902	.....	.....	....
L. Rock & Ft. S.	522,186	453,360	I. 68,826	15.2
Lt. Rock Junction	45,082	38,302	I. 6,780	17.8
L. Rk., M. R. & T.	286,738	256,406	I. 30,332	11.4
Maine Central	2,583,978	2,412,448	I. 171,530	7.1
Net earnings	1,081,598	984,116	I. 97,482	9.9
Mil., L. S. & W.	1,945,779	1,125,035	I. 820,744	72.9
Net earnings	858,855	388,251	I. 470,604	121.2
St. Jo. & Gd. I.	965,130	907,399	I. 57,731	6.4
Net earnings	432,282	276,248	I. 156,034	56.5
Tol. & Ohio Cent.	660,256	.....	.....	....
Net earnings	194,318	.....	.....	....
Valley (Ohio)	561,576	.....	.....	....
Net earnings	239,489	.....	.....	....
Month of October:				
Den. & R. G.	$703,259	$626,362	I. $76,897	12.3
Net earnings	238,904	273,377	I. 25,527	9.3
Des M. & Ft. D.	35,538	42,025	D. 6,487	15.4
Net earnings	15,739	18,133	D. 2,394	13.2
Det., B. C. & Al.	28,002	.....	.....	....
Net earnings	15,410	.....	.....	....
L. Rock & Ft. S.	91,138	82,175	I. 8,963	10.9
L. Rock Junction	5,381	5.314	I. 67	1.2
L. R., M. R. & T.	43,558	44,792	D. 1,234	2.7
Maine Central	302,857	272,012	I. 30,845	11.3
Net earnings	140,236	110,191	I. 30,045	27.3
Mar. & N. Ga.	13,900	.....	.....	....
Net earnings	8,295	.....	.....	....
Mil., L. S. & W.	254,976	160,284	I. 94,692	59.2
Net earnings	127,717	81,484	I. 46,233	56.7
Minn. & N. W.	59,973	.....	.....	....
Net earnings	23,555	.....	.....	....
N. Y., Ont. & W.	120,004	180,200	D. 60,196	33.4
Net earnings	20,433	7,470	I. 12,963	173.5
St. Jo. & Gd. I.	125,479	125,962	D. 483	0.4
Net earnings	63,855	69,815	D. 5,960	8.5
Tol. & Ohio Cen.	87,512	67,572	I. 19,940	29.5
Net earnings	36,358	14,274	I. 22,084	154.5
Month of November:				
Canadian Pac.	$1,073,000	$814,066	I. $258.934	31.8
Cin., H. & Day.	249,882	244,592	I. 5,290	2.2
Cin., R. & Ft. W.	34,079	31,935	I. 2,144	6 7
Col. & Cin. Mid.	28,154	23,280	I. 4,874	21.2
Col., H.Vy. & Tol.	249,356	147,607	I. 101,749	68.9
E. Ten., Va. & G.	418,343	400,781	I. 17,562	4.4
Ev. & T. Haute.	59,903	64,500	D. 4,597	7.1
Flint & Pere Ma.	175,095	177,698	D. 2,603	1.4
Grand Rap. & I.	209,417	191,456	I. 17,961	9.4
Grand Trunk	1,425,110	1,235 872	I. 189,238	15.3
Gulf, Col. & S. F.	292,600	243,064	I. 49,536	20.4
Illinois Central:				
Ill. lines	501,593	584,040	D. 22,447	3.8
South. Div.	461,089	485,349	D. 24,260	5.0
Iowa lines	144,258	167.419	D. 23,161	13.9
Ind., Dec. & Spr.	40,107	39,549	I. 559	1.4
K. C., Clint. & S.	24,358	.....	.....	....
K. C., Ft. S. & G.	245,493	227,891	I. 17.602	7.7
K. C., Spr. & M.	162,288	123,427	I. 38,861	31.5
Lake Erie & W.	96,436	90,854	I. 5,582	6.1
Lehigh & H. R.	19.105	15,657	I. 3,448	22.1
Lou., Ev. & St. L.	71,925	67,079	I. 4,846	7.2
Lou., N. O. & T.	218,449	212,046	I. 6,403	3.0
Marq., H. & O.	66,994	48,576	I. 18,418	37.9
Mem. & Charles.	175,067	150,932	I. 24,137	16.0
Mexican Central.	377,410	312,481	I. 64,929	20.8
Mich. & Ohio	20,941	17,275	I. 3,666	21.5
Minn. & N. W.	61,805	35,242	I. 26,563	75.9
N. Y. C. & H. R.	2,885,832	2,320,901	I. 564,931	24.3
N. Y. City & No.	43,831	40,157	I. 3,674	9.2
Oregon R. & N.	518,000	629,672	D. 111,672	17.7
Net earnings	233,000	342,770	D. 109,770	32.0
St. L., A. & T. H.:				
Main Line	111,674	114,862	D. 3,188	2.8
Belleville Line	78,594	69.735	I. 8,859	12 7
Staten Island	50,300	44.738	I. 5.562	12.4
Texas & Pacific	721,092	712,462	I. 8,630	1.2
Valley (Ohio)	51,880	46.791	I. 5,089	10.8
Wisconsin Cent.	144,899	135.693	I. 9,206	6 8
Min., S. C. & W.	32,136	20 639	I. 11,495	55.8
Wis. & Minn.	49.051	17,369	I. 31,682	182.1
First week in December:				
Buff., Roch. & P.	$27,885	$27,855	I. $30	0.1
Cairo, V. & C.	13,452	11,215	I. 2,237	19.9
Chi. & East. Ill.	43,192	45,014	D. 1,822	4.0
C., I., St. L. & C.	48,156	47,960	I. 196	0.4
Illinois Central.	248,300	272,981	D. 24,681	9 0
Iowa lines	37,800	35,817	I. 1,983	5.5
Mil. & Northern.	14,076	11,039	I. 3,037	27.1

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Coal tonnages for the week ending Dec. 4 are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Anthracite	591,190	659,655	D. 68,465	10.4
Eastern bituminous	259,028	248,782	I. 10,246	4.1
Coke	76,200	75,625	I. 575	0.8

The anthracite market is more active, the cold spell having caused a brisk demand for domestic use.

Bituminous coal shippers are busy filling contracts, and much complaint is made of a short supply of cars for the trade.

Pennsylvania Railroad coal tonnage for the week ending Dec. 4, was:

	Coal.	Coke.	Total.	1885.
Line of road	154,114	75,018	229,132	222,634
From other lines	68,510	1,182	69,692	104,262
Total	222,624	76,200	298,824	326 896
Year to Dec. 4	10,099,544	3,286.587	13.986,131	13,004.954

Decrease for the week, 28,072 tons, or 8.6 per cent.; increase for the year, 981,177 tons, or 7.5 per cent. Shipments of anthracite (1,408 tons) from the Pennsylvania Schuylkill Valley road appear this week for the first time.

St. Louis coal receipts for the eleven months to Nov. 30 were, in tons:

	1886.	1885.	Inc. or Dec.	P.c.
Coal	1,791,013	1,834,944	D. 43,931	2.4
Coke	94,215	49,403	I. 44,812	90.7
Total	1,885,228	1,884,347	I. 881	....

Most of the coal comes from Southern Illinois, but a few miles from the city.

Chicago coal receipts for the eleven months to Nov. 30 are are given by the *Coal Trade Journal* as follows:

	—November.—		—Eleven months.—	
	1886.	1885.	1886	1885.
Anthracite	129,494	153,107	1,240,413	1,238.690
Eastern bituminous	125,077	73,785	911,438	887,996
Illinois	119,471	119,715	1,029,718	1,178,226
Indiana	84,855	64,373	638,416	574,234
Coke	43,596	45,295	488,941	499,444
Total	502,493	456,375	4,308,926	4.376,590

The increase for November was 46,118 tons, or 10.1 per cent.; the decrease for the year was 67,664 tons, or 1.6 per cent. This decrease was almost entirely in Illinois coal.

Actual tonnage passing over the Pennsylvania & New York road for the fiscal year ending Nov. 30, was:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite	1,698,364	1.440,762	I. 257,602	17.9
Bituminous	177,294	231,002	D. 53,708	23.3
Total	1,875,658	1,671,764	I. 203,894	12.2

The anthracite comes chiefly from the Lehigh Valley road, of which this line is an extension.

Cumberland coal shipments for the week ending Dec. 11 were 45,077 tons. Total to Dec. 11 this year, 2,391,686; last year, 2,675,682; decrease, 283,996 tons, or 10.6 per cent

Chicago Shipments Eastward.

The Board of Trade reports east-bound shipments from Chicago for the week ending Dec. 11 as follows, in tons:

	Tons.	P. c.		Tons.	P.c.
Chi. & Gd. Trunk	8,905	19.7	Pitts., Ft. W. & C.	5,751	12.7
Mich. Central	5,048	11.1	Chi., St. L. & Pitts.	5,519	12.2
Lake Shore	7,625	16.9	Balt. & Ohio	4,094	9.1
N. Y., Chi. & St. L.	5,450	12.0	C., Ind., St. L. & C.	2,846	6.3

The statement includes local as well as through shipments. The total of the week was 45,238 tons, being an increase of 4,303 tons, or 10.5 per cent., over the preceding week, and the largest shipments reported since Oct. 30.

Shipments for eight weeks past by these reports have been, in tons:

Week ending							
Oct. 23.	Oct. 30.	Nov. 6.	Nov. 13.	Nov. 20.	Nov. 27.	Dec. 4.	Dec. 11.
45,820	46,688	41,883	37,051	38,409	35,462	40,935	45,238

Shipments by the Chicago & Atlantic road are not included above. These shipments include dead freight only.

New York & Brooklyn Bridge.

For the year ending Nov. 30 the number of passengers passing over the Brooklyn Bridge was:

	1886.	1885.	Inc. or Dec.	P.c.
Railroad	24,029,267	17,023,237	I. 7,006.030	41.2
Foot passengers	3,018,717	3,602,079	D. 583,362	16.2
Total	27,047,984	20,625,316	I. 6,422,668	31.1

The receipts from tolls were $743,539, divided as follows: Promenade, $17,854; carriage-ways, $64,324; railroad, $661,361. The whole number of passengers using the bridge since its opening, May 25, 1883, to Dec. 1, 1886, is 65,427,896, divided as follows: Promenade, 14,801,706; railroad, 50,626,190. The total amount of receipts from tolls since the opening is $2,035,220, divided as follows: Promenade, $122,675; carriageways, $233,141; railroad, $1,679,404.

The trustees have decided to do away with the tolls on foot passengers as soon as they can obtain the requisite legal authority.

Lake Superior Iron Ore.

Shipments of iron ore from the Lake Superior region for the season just closed are given by the Marquette *Mining Journal* as below:

	1886.	1885.	Inc. or Dec.	P. c.
L'Anse	.....	20,027	D. 20,027	100 0
Marquette	851,986	750,047	I. 101,939	13.6
St. Ignace	74,590	93,588	D. 18,998	20.2
Escanaba	1,538,821	1,219,777	I. 319,044	26.2
Ashland	721,983	119,563	I. 602 420	563.8
Two Harbors	304,396	225,484	I. 78,912	35.1
Total	3,491,776	2,428,486	I. 1,063,290	43.8

L'Anse was not a shipping port this year. The *Mining Journal* says: "The shipping season of 1886 is at an end as to lake transportation, and the figures which express the result are an eloquent showing of what the iron mines of Lake Superior are capable of doing under the stimulus of fair prices and reasonably strong market. The output of the boom year of 1882 has been handsomely exceeded, while the shipments for the current season are ever a million tons in excess of the quantity sent to market from the mines of this region last year. An encouraging feature of the situation in iron is the fact that the unexampled production this year has not glutted the market, the demand for ore continuing strong, and there being a reasonable certainty that the next shipping season will set in with the ore docks at lower ports cleared for action in 1887."

Associated Roads of Kentucky, Alabama and Tennessee.

It is rumored that this association will be disrupted at the close of the year, owing to disagreements between the members. It was formed in 1883. Mr. J. R. Ogden is the present Commissioner.

Advance in East-bound Rates.

Commissioner Fink announces that east-bound rates will be advanced Dec. 20 to the following basis: Chicago to New York, on 12th class and live hogs, 35 cents per 100 lbs.; on the 13th class, 30 cents. This is 5 cents per 100 lbs. higher than the present tariff.

Middle & Western States Freight Association.

At St. Louis, Dec. 8, it was decided to advance rates on all classes of west-bound freight to the basis of 50 cents per 100 lbs. on first-class, Pittsburgh to Chicago, to take effect Jan. 3, 1886. The present first-class basis is 45 cents. On the lower class the advance is about 2 cents per 100 lbs.

A new form of bill of lading was also adopted, and it is reported that shippers strongly object to the following clause in the new bill: "Neither this company nor any such other carrier shall be liable for any loss or damage to said property by dangers or accidents incident to railroad transportation, or by fires or floods, while at depots, stations, yards,

landings, warehouses, or in transit; and said property is to be carried at owner's risk of leakage, breakage, chafing, loss in weight, or loss or damages caused by changes in the weather, or by heat, frost, wet or decay; and if any portion of the route to destination is by water, of all dangers incident to navigation."

Northwestern Passenger Pool.

At a meeting of the general managers and general passenger agents of the roads interested at Chicago last week, the Chicago Milwaukee & St. Paul refused to include in the pool its local business between Minneapolis and St. Paul and Milwaukee. The other roads would not assent to the exclusion of this traffic, claiming that if it was exempted, the routes across the lake would be enabled to make lower rates from St. Paul and Minneapolis to the East than were made *via* Chicago.

The question of percentages was also considered but no agreement made, the Rock Island insisting that the percentages of the old roads (the Milwaukee & St. Paul, the Northwestern and the Rock Island) should be based on the average business of the last three years.

After referring these two questions to a special committee, the meeting adjourned subject to call of the Chairman.

Wabash Appeals.

The Wabash road has appealed from Commissioner Fairthorn's award of percentages in the Omaha, Council Bluffs and Papillion local pool. Under the agreement, the matter goes before the Executive Committee for action. If their decision is not accepted, the question will have to go to arbitration, which reward will be final.

Trunk Line Executive Committee.

A meeting of this committee was held at the office of the Commissioner in New York, on Dec. 14. No action of special importance was taken.

Central Traffic Association.

At a meeting in Chicago, Dec. 14, Mr. W. P. Johnson, now General Passenger Agent of the Lake Shore road, was unanimously nominated as permanent Arbitrator. This nomination is subject to ratification by the general managers.

It was also agrreed that mileage tickets purchased to test rates should be redeemed at 2½ cents per mile.

At a meeting of the general managers on Dec. 15, it was decided not to appoint a Passenger Arbitrator, until it was determined whether one arbitrator should act on both passenger and freight questions. The Commissioner was requested to ask for signatures of all managers to the agreement abolishing commissions after Jan. 1, 1887.

RAILROAD LAW.

Bill to Regulate Interstate Commerce.

Washington dispatches state that the Conference Committes of the Senate and the House have agreed on a substitute for the Reagan and the Cullom bills to regulate interstate commerce. A synopsis of the new bill is as follows:

The act is made to apply to the transportation of passengers or property by railroad, or partly by railroad and partly by water, when both are used under a common control, management or arrangement, for a continuous carriage or shipment between any of the states or territories. Section 2 prohibits unjust discrimination in charges between individuals by means of special rates, rebates or other device for a like and contemporaneous service under substantially similar circumstances and conditions. Section 3 prohibits the making or giving of any undue or unreasonable preference or advantage to any particular person, company, firm, corporation or locality, or any particular description of traffic in any respect whatever. Railroads are required to afford all reasonable, proper and equal facilities for the interchange of traffic between their respective lines, and are prohibited from discriminating in their rates and charges between connecting lines. Section 4 relates to long and short hauls and makes it unlawful for any railroad to charge more for the transportation of passengers or of like kind of property, under substantially similar circumstances and conditions, for a shorter than for a longer distance over the same line and in the same direction, the shorter being included within the longer distance, with the proviso that in special cases, upon application by the railroads and after investigation, the Commission may prescribe the extent to which such railroad shall be relieved from the operation of this section. Section 5, on the subject of pooling, is as follows:

"That it shall be unlawful for any common carrier subject to the provisions of this act to enter into any contract, agreement or combination with any other common carrier or carriers, for the pooling of freights of different and competing railroads, or to divide between them the aggregate or net proceeds of the earnings of such railroads, or any portion thereof, and in any case of an agreement for the pooling of freights as aforesaid, each day of its continuance shall be deemed a separate offense."

Section 6 requires railroads to print and keep at every station for public inspection copies of their schedules of rates and fares and charges between all points upon their own lines, and prohibits them from charging more or less than the rates they may thus establish and make public. Advances in such rates and fares and charges must not be made except after ten days' public notice. Reductions may be made without previous public notice, but notice of the same must be given immediately. If a railroad refuses to make its rates public as required, the Commission must institute proceedings in the United States courts, which are authorized to enforce obedience by any method that may become necessary, even to stopping the road from transacting business. Section 7 provides that interstate shipments shall be considered as continuous from the place of shipment to the place of destination, despite any breaking of bulk, stopping, or interruption made to evade the act. Section 8 makes any common carrier subject to the act liable to the person injured for the damages sustained by any violation of the provisions of the act, together with a reasonable attorney's fee in every case of recovery. Section 9 provides that any person claiming to be damaged may either make complaint to the Commission, or may bring suit in the United States Court for the recovery of damages to which the common carrier may be liable under this act, but such persons must elect which courses they will pursue, and cannot adopt both. Section 10 declares a common carrier or any officer or employé of one who shall willfully violate any of the provisions of this act guilty of a misdemeanor, and makes the penalty a fine of not exceeding $5,000.

Section 11 provides for the appointment of five commissioners by the President. No person in the employ of or holding any official relation to any common carrier subject to the act, or owning stock or bonds thereof, or who is in any manner pecuniarily interested therein, can hold such office, and not more than three of the commissioners can be appointed from the same political party. Section 12 gives the commissioners authority to inquire into the management of the business of the railroads, and to obtain from them full and complete information, and for this purpose the commission is given power to require the attendance and testimony of witnesses and the production of books and papers. Section 13 provides that complaints may be made by petition to the Commission by anybody complaining of any violation of the act. Section 14 requires written reports of all investigations, and makes such reports of the commission *prima facie* evidence as to the facts therein stated in all judicial proceedings. It is provided in section 15 that when the Commission finds the act has been violated it shall inform the railroad of its finding and set a time within which it must make reparation. If the railroad, after such investigation and finding, complies with the requirements of the Commission it is relieved of further penalty. Section 17 relates to the proceedings of the Commission, which must be public upon the request of either party interested. Section 18 fixes the salaries of the commissioners at $7,500 per annum and provides for its employés and expenses. Section 19 authorizes the Commission to make investigations and hold special sessions in any part of the United States, but its principal office is to be in Washington. Section 20 makes it the duty of the Commission to require annual reports from the railroads, which must contain a complete exhibit of all their financial operations. Section 21 requires the Commission to report annually to Congress.

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—The Great Bend Extension of the Chicago, Kansas & Western line is now completed to Alexander, Kan., 14 miles beyond the recent terminus at Rush Centre and 50 miles from the junction with the main line at Great Bend. Grading is in progress from Rush Centre to Ness City, 20 miles.

The Texas Extension of the Southern Kansas line is now completed to Ponca, in Indian Territory, 36 miles southward from Arkansas City, Kan. Work is progressing steadily on this line, and the present expectation is that the connection with the Gulf, Colorado & Santa Fe will be completed by May next.

Atlanta & Hawkinsville.—A meeting of the stockholders of this company was held in Atlanta, Ga., Dec. 8. Resolutions were passed authorizing the directors to execute a mortgage on the projected line and to issue bonds to the amount of $12,000 per mile, to bear not more than 6 per cent. interest.

The contractor for the first section of the road will begin work near Atlanta in a very short time, and it is hoped that the road will be all under contract by the beginning of the new year.

Baltimore & Ohio.—The connection with the Reading tracks in Philadelphia having been completed, through trains began to run through to New York over the Reading and New Jersey Central tracks, Dec. 15. At present, and until more complete arrangements are made, only one through passenger, one local and one emigrant train are run, but the number will be increased shortly.

The Baltimore & Ohio Telegraph Co. has completed its connection with the Canadian Pacific line and will interchange telegraph business with all the lines of that company. Arrangements have been made for the construction of a line from Vancouver to San Francisco in connection with the Canadian Pacific.

Central, of Georgia.—Representatives of the Alexander party of the stockholders have applied to the Superior Court at Savannah, Ga., for a writ of mandamus to compel the company to exhibit to them the stock books, or to allow them access to those books, in order that they may ascertain who are the stockholders of the company. The officers of the company have refused to allow any stockholder to examine the books, and it is claimed that they have no legal right to do so.

Central, of New Jersey.—This company has applied to the United States Circuit Court for an order to restrain the Philadelphia & Reading Co. from removing certain supplies now in the stores of the road prior to surrendering possession on Jan. 1 next.

Chicago & Atlantic.—In Chicago, Dec. 11, the United States Circuit Court made a temporary order to restrain this company from excluding United States Express from its lines, and also from admitting the Erie Express. The injunction is to stand until further orders are made in the case. The court granted the Erie Co. leave to enter into the suit as a co-defendant with the Chicago & Atlantic, and directed that answers be filed in the case and preparations made for a hearing of the case on its merits.

Chicago, Burlington & Quincy.—One of the large buildings of this company at Aurora, Ill., was destroyed by fire on the night of Dec. 13. The origin of the fire is unknown. The building destroyed contained the wood machine shop, the cabinet shop and the pattern shop, and the loss is estimated at $60,000.

Chicago, Santa Fe & California.—This company has filed articles of incorporation in Illinois to build a line of railroad from Streator, Ill., to the Mississippi River opposite Ft. Madison, Ia.; from Streator to Keokuk, Ia., and from Pekin to Rock Island. The lines named are intended as extensions of the Chicago & St. Louis road, and the company is said to be organized in the interest of the Atchison, Topeka & Santa Fe.

Cincinnati, Wabash & Michigan.—The report that this road is to be sold to the Cincinnati, Hamilton & Dayton Co. is revived, and it is now said that the property will change hands Jan. 1, but no official statement to that effect has been made.

Columbus & Southern.—The engineers who are locating this projected line have completed the surveys from Columbus, Ga., southward to Albany, a distance of 88 miles, and are now working from Albany southward.

Colusa & Lake.—The Colusa and the Colusa & Lake companies have been consolidated under the name of the Colusa & Lake Railroad Co. The consolidated company owns a line, which has been built this year, from Colusa, Cal., west 10 miles to Colusa Junction on the Oregon Division of the Central Pacific, and thence southwest 12 miles. Work is in progress from the present terminus southwest to Lower Lake in Lake County, a distance of 27 miles. The capital stock is $400,000.

Dakota Railroads.—The second annual report of the Board of Railroad Commissioners of the Territory of Dakota for the year ended June 30, 1886, has been issued in pamphlet form. The report shows the amount of capital stock, preferred stock, funded debt, floating debt, cost of road and equipment, the property owned, the extent of the land grant, the officers and directors, and a general statistical statement of the transportation of each road, as well as recommendations as to needed legislation by the territorial Legislature. The report says that in so far as the law could so provide, the management of the railroads in the territory is conducted with a view to furnish every shipper of grain open and untrammeled transportation to any market he may choose. This assertion is qualified in so far as the transit system may be regarded as an obstruction.

The past year has been marked by unusual activity in the construction of new railroads and the extension of several of the old lines. The increase in mileage foots up 551.77 miles, and is divided as follows:

Burlington, Cedar Rapids & Northern	9.80
Minneapolis & Pacific	29.64
Fremont, Elkhorn & Missouri Valley	85.50
Northern Pacific	15.20
Milwaukee & St. Paul	176.60
Northwestern	71.03
Manitoba	163.40
Total	551.17

This increase make the total number of miles of completed road in operation in Dakota, June 30, 1886, 2,897.67.

According to the returns made by the Commission there are in Dakota 344 elevators and 306 warehouses, having an aggregate capacity of 13,843,000 bushels. Of these there are in North Dakota 206 elevators, 54 warehouses, 9,012,000 bushels, and in South Dakota 138 elevators, 252 warehouses and 4,831,600 bushels. These are scattered along the several lines of railroads as follows:

Railroads.	Elevator.	Warehouse	Bushels.
Manitoba	141	28	5,983,000
Northern Pacific	61	17	2,855,000
Milwaukee & St. Paul	98	106	2,590,400
Northwestern	35	146	2,120,200
Minneapolis & St. Louis	4	7	185,000
Omaha	2	..	85,000
On the Red River	3	..	72,000

Those of the Burlington, Cedar Rapids & Northern are not included.

Denver, Memphis & Atlantic.—The Fitzgerald & Mallory Construction Co., contractor for this road, reports track laid during November on the Chetopa Division from a point ⅛ mile west of Tyro, Kan., west to a point 2½ miles west of Peru, the new stations opened being Caney, Tyro and Peru. On the Conway Springs Division track was laid from a point ⅛ mile east of Penalosa, west 3 miles, and Penalosa station was opened for business. This makes a total of 23 miles of track laid during the month.

Denver & Rio Grande.—Notice is given that the United States Trust Co. in New York will deliver on and after Dec. 20 against its certificates for the old company's stock deposited and assessments paid orders upon the new company for the preferred and common stock receivable therefor under the plan of reorganization.

East Tennessee, Virginia & Georgia.—The statement for October and the four months of the fiscal year from July 1 to Oct. 31 is as follows:

	October.		Four months	
	1886.	1885.	1886.	1885.
Earnings	$456,617	$411,380	$1,546,854	$1,418,877
Expenses	212,308	219,672	890,156	799,209
Net earnings	$244,309	$191,708	$656,698	$619,668

For the four months the gross earnings increased $127,977, or 9.0 per cent., and the expenses $90,947, or 11.4 per cent., the result being a gain of $27,030, or 4.4 per cent., in the net earnings.

Fort Worth & Denver City.—This company's statement for October and the fiscal year ending Oct. 31 is as follows:

	October.		Year.	
	1886.	1885.	1885-86.	1884-85.
Earnings	$61,800	$43,793	$423,130	$448,711
Expenses	24,600	20,140	248,053	251,079
Net earnings	$37,200	$23,653	$175,077	$197,632

For the year the gross earnings decreased $25,581, or 5.7 per cent., and the expenses $3,026, or 1.2 per cent., leaving a decrease of $22,555, or 11.1 per cent., in the net earnings.

At the annual meeting in Fort Worth, Tex., Dec. 13, resolutions were passed to limit the issue of bonds on the road to $16,000 per mile.

Georgia, Carolina & Northern.—The incorporators of this company met in Athens, Ga., Dec. 9, and voted to accept the charter as passed by the Georgia Legislature. A considerable amount of subscription to the stock was reported, the amount being considerably in excess of that required to organize a company, as delegates were present from various points in Georgia, offering right of way and land for stations. The company was organized and the President was authorized to have surveys made at once of the line from Atlanta to the Savannah River.

Gulf, Houston & Rio Grande.—This company, whose organization was recently noted, intends to purchase the old Texas Western road and extend it from Houston to some port on the Gulf of Mexico and from the present terminus westward. The Texas Western road is now in operation from Houston to Sealey, a distance of 53 miles, and has been graded for some distance further.

Illinois Midland.—In Washington, Dec. 10, Justice Harlan made final orders in the foreclosure suit. The offer of Mr. R. K. Dow, the purchaser at the foreclosure sale, to pay, in addition to his bid of $1,127,000, the sum of $18,500 for the benefit of labor claims, is accepted and the sale is confirmed. The purchaser is directed to pay his bid into court in three installments on the first days of January, February and March next. The Court also settled all questions of allowances.

Illinois & St. Louis.—The St. Louis *Republican* reports that Mr. C. P. Huntington is negotiating for a controlling interest in this company. The road is a coal road extending from East St. Louis to Belleville, 15 miles, with several short branches to coal mines. The company owns a very desirable terminal property in East St. Louis and at Carondelet and Venice, and controls the Venice & Carondelet Belt road around East St. Louis. The object of Mr. Huntington in securing control of the road is doubtless to secure the use of the terminal property, and it is understood that this is part of his plan for an extension of the Chesapeake & Ohio to St. Louis, either directly or over the Louisville, Evansville & Terre Haute road.

Indiana, Illinois & Iowa.—The extension of this road has been completed and is opened for business to Knox, Ind., 9 miles eastward from the late terminus at North Judson. Regular trains are now running to the new terminus.

Joliet, Aurora & Northern.—At a recent meeting of the stockholders in Joliet, Ill., resolutions were passed authorizing the issue of bonds for the purpose of extending the line eastward from Joliet to make connection with some of the eastern trunk lines in Indiana.

Kansas Railroad Subsidies.—The Topeka, Kan., *Capital* says: "A short time ago, the Board of Railroad Commissioners sent a blank to all the county clerks, requesting them to furnish information showing the amount of bonds which have been voted in their counties in aid of railroads during the past year. The letter requested that the amount of county, township and city bonds be given. The Commissioners have received replies from all but 8 to 10 counties. Nearly nine-tenths of the counties have voted bonds during the year, and some of them have bonded themselves during the year to the amount of $400,000. According to the replies thus far, which include about 75 counties, the total amount of county bonds voted the railroads during the year is $5,253,000; township bonds, $3,353,600, and city

bonds, $616,500; the total amount issued and delivered during the year in the same counties was as follows: County bonds, $282,000; township bonds, $907,600; city bonds, $122,000."

Leroy & Eastern.—This company has filed articles of incorporation for a line from Leroy, Ill., east to the Indiana state line, to connect there with the road extending to Lebanon, Ind. The route covers the line of the Havana, Rantoul & Eastern road, recently sold under foreclosure.

Long Island.—The statement to the New York Railroad Commission for the quarter ending Sept. 30, is as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Gross earnings	$1,150,621	$1,084,170	I. $66,451	6.1
Operating expenses	536,101	575,063	D. 38,962	6.8
Net	$614,520	$509,107	I. $105,413	20.7
Other income	37,026	70,697	D. 33,671	47.6
Total	$651,546	$579,804	I. $71,724	12.3
Charges	269,965	260,478	I. 9,487	3.6
Surplus	$381,581	$319,326	I. $62,255	19.5

The usual dividend for the quarter (1 per cent.) was paid. The September quarter is the period of heaviest earnings on this road, as it has a heavy passenger traffic in the summer.

Louisville & Nashville.—It is stated that this company, after conference with the officers of the Sheffield Land Co. and the Sheffield Coal and Iron Co., has decided to build a line from Columbia, Tenn., to Sheffield, Ala., a distance of 85 miles. The line will be built by a company to be known as the Nashville, Florence & Sheffield Co., and will be leased by the Louisville & Nashville.

Mankato & Albert Lea.—This company has filed articles of incorporation to build a railroad from the Iowa state line, through Albert Lea and Mankato, to the northern boundary of the state. The line proposed is very much the same as that projected, but never built, by the Austin, Mankato & St Cloud Co. The object of the present organization is to secure, if possible, the land granted to that company.

Memphis & Bristol.—The Nashville (Tenn.) *Banner* of Dec. 13 says: "A charter will be applied for incorporating the Memphis & Bristol Railroad Co. The proposed line runs from Memphis across the Tennessee river, through Hickman and Wayne counties to Nashville, thence east to Bristol, where connection will be made for all points east and south. The company was organized by E. W. Cole, Wm. Morrow and others of this city and Memphis. The road, if built, will do away with the necessity existing for a road to Knoxville, such as was proposed in the Crawford road, as the line runs directly through the section of country contemplated by that road."

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Dec. 4.

A good passenger business is reported on the Sonora Railroad.

Mr. Delfin Sanchez of the Interoceanic Railroad has gone to Europe, and the affairs of the corporation are, during his absence, in the hands of Mr. José Sanchez.

The wise financial policy of the Administration, which has had for its most conspicuous feature the adjustment of the foreign debt, now finds itself justified in the growing favor with which almost every kind of Mexican investments are regarded abroad. No sound man of business doubts for a moment that the efforts of the railroad companies to secure funds in London for building their branches and completing their lines are materially aided by the restoration of the credit of the nation. Had not the government made an acceptable arrangement with its English creditors, Mexico would to-day be classed with the defaulting nations which have no standing in the money-markets of the world, and which lag behind in the race of civilization because no one is willing to risk a dollar in their aid. The steady advance of the bonds of the English debt, since the beginning of the negotiations for a settlement, has been accompanied by a rise in Mexican railroad securities, and we have no hesitation in saying that, had Mexico neglected to make an honorable adjustment with her creditors, the obtaining of money in London for railroad construction here would have been rendered much more difficult. In point of fact, the government has, by its good faith, given a powerful stimulus to all Mexican properties. There is not an acre of arable land in the country, there is not a transportation line, nor a mine, which is not to-day worth more because of the placing of Mexico in the list of interest-paying nations. All enterprises are in close relation to the government and all are vitally interested in the maintenance of the national honor. We might easily, by the employment of casuistry, beguile ourselves into believing that some of the debts which the nation is pledged to pay are not entirely soundly based, but foreign nations do not look at details. The point in the money-centres of the world is simply, Is there a debt, and is the interest on it being paid? It is best to be a little more than strictly honest; it is best to be even a trifle over-scrupulous. A good reputation for the honorable recognition of all liabilities is the origin of credit.

Missouri Pacific.—The stockholders met in St. Louis, Dec. 10, and voted to authorize an issue of $4,000,000 additional stock, for the purpose of paying for extensions and improvement of the road. They have also voted to authorize the directors to issue $5,000,000 in new 5 per cent. collateral trust bonds, to be secured by the deposit with the trustees of first mortgage bonds of roads operated by the Missouri Pacific Co. and part of its system. The stockholders also approved the leases of several of the lines recently completed in Kansas.

The company is having surveys made for a branch from Jefferson City, Mo., to Lexington, and it is stated that construction will be begun immediately.

It is stated that the company has negotiated the sale of $2,000,000 additional general mortgage bonds of the Missouri, Kansas & Texas Co. in London. The proceeds of these bonds are to be used to pay for extensions of that road in Texas.

This company's Verdigris Valley, Independence & Western road is now completed to Winton, Kan., 8 miles beyond the late terminus at Independence and 75 miles from the Junction with the Kansas & Arizona Division at Leroy.

The Greenville & Dallas Branch of the Missouri, Kansas & Texas Division has been completed and opened for business from Dallas, Tex., southwest to Rockwall, a distance of 25 miles. Work on this branch is steadily progressing.

Nashville, Chattanooga & St. Louis.—This company will issue $500,000 in new 5 per cent. bonds for the purpose of paying for the railroad line owned by the Tennessee Coal, Iron & Railroad Co., which it recently purchased.

New Castle Northern.—The United States Circuit Court in Pittsburgh has ordered a resale of this unfinished road, on the ground that the price brought at the former sale was insufficient. The new sale will take place Jan. 12 next.

New York & New England.—At the annual meeting in Boston, Dec. 14, resolutions were passed approving the proposed consolidation of the Connecticut Central with this company and the purchase of the Springfield & New London road.

The election of directors resulted in the defeat of the ticket prepared by the Clark or Boston party, which contained nearly all the old directors, and in the election of a new board, apparently by a combination of the New York party, headed by J. A. Bostwick, and the French party, of Boston. The supporters of this ticket voted on about 113,000 shares, against about 60,000 shares in favor of the old board. Mr. Bostwick is chosen President of the new company. What the policy of the new management will be is not yet fully developed or announced, but it is said that their intention is to build the line from Danbury to New York, and to develop the New England road into an independent route between New York and Boston. How much of the stock is owned by the new managers is uncertain, as a considerable part of their vote was made up purchased of proxies. It is said that Mr. Clark will be asked to continue with the road as General Manager, but it is uncertain whether he will accept.

New York, Ontario & Western.—The gross and net earnings for October, the first month of the fiscal year, have been as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	$120,004	$180,200	D. $60,196	33 4
Expenses	99,571	172,730	D. 73,159	42.2
Net earnings	$20,433	$7,470	I. $12,963	173.5

Expenses include taxes in both years; in 1885 they include rental of West Shore tracks also. The statement for the month this year does not include the line from Cornwall to Weehawken, but last year's figures do include that line.

New York, Rutland & Montreal.—It is stated that bondholders of the Lebanon Springs Railroad, which passed into the possession of this company through foreclosure sale, will begin proceedings to set aside the foreclosure and sale, claiming that it is illegal.

Northern (New Hampshire).—The suit of Dow and others against this company, brought to set aside the lease of the road to the Boston & Lowell Co., came up in the New Hampshire Supreme Court last week, and after a brief hearing the court adjourned the case until the March term, to enable the counsel to make answers and furnish briefs with special reference to the constitutional point in the controversy.

North Platte, Lakin & Tascosa.—This company has been incorporated in Kansas for the purpose of building a railroad from North Platte to Lakin, Kan., thence to the Colorado line, and through Colorado and Texas to Tascosa, Tex., a distance of about 500 miles.

Oregon Improvement Co.—This company's statement for October and the eleven months of the fiscal year from Dec. 1 to Oct. 31 is as follows:

	October.		Eleven months.	
	1886	1885.	1886.	1885.
Earnings	$303,983	$309,357	$2,659,816	$2,646,648
Expenses	217,017	205,858	1,984,137	2,072,570
Net earnings	$86,966	$103,499	$675,679	$574,078

For the eleven months the gross earnings increased $13,168, or 0.5 per cent., and the expenses decreased $88,433, or 4.3 per cent., the result being a gain of $101,601, or 17.7 per cent., in the net earnings.

Oregon Railway & Navigation Co.—The Union Pacific directors have approved the draft of the proposed lease of this company's property.

Philadelphia & Reading.—The Executive Committee reported back the revised reorganization plan to the trustees or Dec. 14, containing the alterations suggested by the syndicate. It was announced that the trustees have completed their work, and it only remains to have it approved by the managers before giving it to the public.

The Philadelphia *Ledger* of Dec. 15 says: "The new plan, which has been a very long time incubating, is an elaborate document, dealing with all the various classes of securities of the company. It is based upon the issue of a new general mortgage 4 per cent. loan of $100,000,000, which is to be the first lien upon all the company's properties. Of this issue $33,421,700 is to be reserved to take up all the mortgages prior to the present general mortgage; and $24,681,000 repays at par the principal of the present outstanding general mortgage. This leaves $41,897,300 new 4s for the following purposes: To take up the general mortgage sterling scrip, $1,697,000; to redeem existing real estate mortgages, $2,100,000; to cover advances made by Drexel & Co. of 4 per cent. per annum interest for three years on certificates issued for general mortgage bonds deposited under the plan, $3,000,000; to provide for taking up the shares and bonds of leased lines belonging to the Reading system, $15,000,000, and for the exchange or redemption of divisional coal land mortgages of the Reading Coal & Iron Co., $10,000,000. This will absorb all of the new 4 per cent. bonds but about $10,100,000, and this balance is reserved for betterments, new equipment and other uses that may hereafter be thought beneficial to the company. The plan provides that the existing general mortgage 6s and 7s are to be paid off, par and accrued interest, in cash prior to July 1, 1888, through the negotiation of a sufficient amount of these new general mortgage bonds in the market, or if not so paid they will be exchanged with the adjustment of interest down to Jan. 1, 1889, at the rate for each $1,000 old 6 per cent. bond of $1,000 new 4s and $480 first income 5s, and for each $1,000 old 7 per cent. bond $1,000 new 4s and $500 first-income 5s. In each case the holder will by that time have also received $120 interest on his certificate from Drexel & Co., as above provided for. The new first-income 5 per cent. bond is to be non-cumulative, and to be issued in the exchange of the recent general mortgage bonds and for the cash assessments made on the junior securities and the stock. It is estimated that about $12,500,000 of these first-income bonds will be issued for the cash assessments, and, should a settlement take place with the general mortgage holders on the basis herein indicated, about $12,000,000 more will be issued for that purpose.

"In dealing with the junior securities and the stock the plan is substantially the same as that originally issued last March in the amounts of cash assessments and the exchanges of new for old securities. For all the cash paid for assessments first income 5s are to be issued at par, and if all these securities and the stock accept the plan, there will be $12,500,000 cash thus raised, which money is to be used for the repayment of receivers' certificates and all overdue interest on the consolidated and improvement mortgages, and, also, in dealing with the secured floating debt. The cash assessments required from each class of securities are as follows: Income bonds, first series 5s and convertible adjustment scrip, 10 per cent. on the par value; second series 5s, convertible 7s, debenture bonds of the railroad and the Coal & Iron Co., and unsecured claims when duly proven, whether funded or floating debt, 15 per cent. on the par value; preferred and common stock, $10 per share, and deferred income bonds, 2½ per cent. on the par value. Each of these classes of bonds, except the deferred incomes, will receive an equal amount to its present par value in the new second and third income 5s. The deferred incomes get one-fifth the par value. After the plan is issued, and has thus become known to the various classes of security holders, the Trustees will publish a call to them to deposit their securities and receive certificates, the general mortgage bonds to be deposited with Drexel & Co., and all the other securities and stock with Brown Brothers & Co., and this call will give 60 days' notice of the date upon which the time for making deposits will expire."

Providence & Worcester.—The stockholders of this company are offered the privilege of subscribing, on or before Feb. 15 next, for one share of new stock at par for each 5 shares of their present holding. This will increase the stock of the company from $2,500,000 to $3,000,000. The company has paid 6 per cent. dividends for a number of years past.

Richmond & Danville.—Formal possession of the management of this road was transferred to the Richmond & West Point Terminal Co. on Dec. 13, that company having made payment for the majority of the Richmond & Danville stock, as agreed.

St. Louis, Alton & Terre Haute.—Notice is given that this company has leased the St. Louis Southern, formerly known as the St. Louis Coal Railroad, for a period of 999 years, from Dec. 1, and has taken possession of that road. The newly leased line extends from Pinckneyville, Ill., to Marion, 47½ miles, with a branch to Murphysboro, 2 miles. It will be known as the Marion Division. The object of the lease is to secure the coal traffic of the road, which is considerable.

St. Louis & Central Illinois.—The following circular is dated St. Louis, Mo., Dec. 1:

"In pursuance of an order of the United States Court, the St. Louis, Jerseyville & Springfield Division, or Jerseyville Branch of the Wabash, St. Louis & Pacific Railway is transferred to this company, and possession given this date.

"The line will be operated as an entirely independent one, and will include, by special arrangement, the use of Wabash, St. Louis & Pacific Railway track between Bates and Springfield, Ill., as well as terminal facilities at Springfield. General offices located at Jerseyville Ill.

"The road from Springfield to Grafton, Ill., is in the best physical condition, and new equipment and train service has been provided for the best accommodation of patrons.

"Remittances should be made to and drafts for balances will be drawn by H. A. Fisher, Treasurer, Jerseyville, Ill. Ticket reports should be addressed to W. R. Church, Accountant, Jerseyville, Ill."

St. Louis, Fort Scott & Wichita.—The Wichita & Colorado Branch of this road is now completed to Hutchinson, Kan., 6 miles beyond the late terminus at Elmer, and 47 miles from the main line at Wichita. Trains are running to the new terminus.

St. Louis, Kansas City & Colorado.—A St. Louis dispatch of Dec. 13 says: "In the suit of the St. Louis, Kansas City & Colorado Railroad *vs.* the Wabash Railroad, to force an entrance through Forest Park in the western part of this city to the Union Depot over the tracks of the Wabash, the United States Circuit Court decided to-day in favor of the Colorado road, holding that under the agreement made by the Wabash with the city of St. Louis the Colorado Co. had a right to such use upon the payment of a rental of 6 per cent. on one-half of the valuation of the Wabash right of way through the park, and to pay for the maintenance of tracks and sidings on a wheelage basis. This lets the St. Louis, Kansas City & Colorado into the Union Depot. Judge Treat filed a separate opinion, coinciding with Judge Brewer as to the right of the St. Louis, Kansas City & Colorado Co. to enter the city over the Wabash right of way, but dissenting as to the propriety of fixing the rate of compensation at the present time."

St. Louis Southern.—As noted elsewhere, this road has been leased to the St. Louis, Alton & Terre Haute Co., from Dec. 1. The rental is to be 30 per cent. of the gross earnings, the lessee guaranteeing a minimum rental of $32,000 yearly. The road was formerly the St. Louis Coal Railroad, and was sold under foreclosure and bought in by the bondholders, who organized the present company.

San Antonio & Aransas Pass.—The Yorktown Branch of this road is now completed from Kenedy Junction, Tex., 63 miles from San Antonio, to Yorktown, a distance of 25 miles. The time-table of Dec. 6 shows trains running over the road.

Southern Pacific.—Passenger trains on the Northern Division of this road are now running to Templeton, Cal., 78.7 miles southward from the old terminus at Soledad and 111.9 miles from the junction with the Monterey line at Castroville and 221.6 miles from San Francisco. The new terminus is 5½ miles beyond the Paso Robles hot springs.

Strikes.—The freight conductors on the Louisville, New Albany & Chicago road struck Dec. 13 the company having refused to grant a request for an increase of pay and allowances for loss of time. The brakemen supported the strike, and freight traffic was temporarily stopped.

The freight brakemen on the Louisville & Nashville road have asked for an increase of pay, but it is not thought probable that there will be a strike, as it is more likely that a compromise will be agreed upon.

Taylor, Elgin & Bastrop.—Track on this road is now laid to Bastrop, Tex., 19 miles south of the terminus at Elgin and 36 miles from Taylor. The road is controlled and will be operated by the Missouri Pacific.

Troy & Greenfield.—The Governor and Council of Massachusetts have decided, in relation to the petition of the Fitchburg Railroad Co. for permission to consolidate with the state roads and the remonstrance presented by the Boston & Lowell, that the Fitchburg Co. is not correct in its claims that it is the only corporation competent, under the act of 1885, to consolidate with the Troy & Greenfield Co. They consider that the Boston & Lowell, as lessee of the Central Massachusetts road, is entitled to recognition as a bidder. No further action will be taken until that company puts in its formal bid or proposition for consolidation.

Wabash, St. Louis & Pacific.—The first mortgage bondholders, who are represented by Mr. Henry Crawford, have decided to push their suit and will present an application to Judge Gresham in Chicago next week for the appointment of a receiver for the property in Illinois and Indiana. They will also push the motion to compel the purchasing committee to pay into court the money to liquidate the receiver's debts, failing that they will ask that the foreclosure be set aside.

Western Maryland.—The connection between this company's Baltimore & Cumberland Valley Branch and the Harrisburg & Potomac road at Shippensburg, Pa., is completed, and the transfer of freight between the two roads began Dec. 11. The connection is three-fourths of a mile long and has been built by the Western Maryland.

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Del., Lacka. & Western..	104, 156	Richmond & Alleghany.....	86
Denver & Rio Grande	139, 536	Richmond & Danville.....	85
Denver & Rio Gr. Western	791	Richmond, Fred. & Potomac..	86
Des Moines & Fort Dodge.....	291	Rochester & Pittsburgh.....	86
Detroit, Lansing & No.....	323	Rome, Wat. & Ogdensburg	85
Detroit, Gd. Ha. & Mil.	324, 518, 769	Rutland.....	493
Dublin & Wrightsville.....	255	St. Jo. & Grand Island.....	734
Eastern.....	861	St. L., Alton & Terre Haute....	583
East St. L. & Carondelet.....	651	St. L., Iron Mt. & So.....	367
East Tennessee, Va & Ga.	595, 632	St. L. & San Francisco.	192, 343, 360
Elizabeth, Lex. & Big Sandy.....	734	St. L., Van. & Terre Haute.....	292
Erie & Pittsburgh.....	651	St. Paul & Duluth.....	155
Evansville & Terre Haute.....	734	St. P., Minn. & Manitoba .594,	682
Fitchburg.....	68	Sandy River.....	826
Flint & Pere Marquette.....	570	Savannah, Fla. & Western	344
Fort Wayne, Cin. & Louisv...	307	Scioto Valley.....	587
Fremont, Elkhorn & Mo. Vy ..	535	Shenandoah Valley.....	570
Galveston, Har. & San Antonio.	770	Sioux City & Pacific.....	535
Galveston, Houston & Hen	597	South Carolina.....	208, 308
Georgia Pacific.....	272	Southern Pacific (Cal.).....	636
Georgia Railroad.....	714	Southern Pacific Co.....	470
Georgia R. R. Commission.....	751	Sou Ry. & Steamship Ass'n..	537
Grand Rapids & Indiana.	652	Stewartstown.....	308
Grand Trunk.....	324, 769	Terre Haute & Indianapolis	470
Gulf, Colorado & Santa Fe	454	Terre Haute & Logansport....	470
Hanover June , Han. & Gett'g.	414	Texas & New Orleans.....	771
Housatonic.....	192	Tol., Ann Arbor & N. Mich	621
Houston & Texas Central.....	272	Traverse City.....	652
Huntingdon & Broad Top Mt...	120	Troy & Greenfield.....	228
Illinois Central.....	174	Union Pacific.....239,	665
Indiana, Bloom. & Western....	750	Utica & Black River.....	272
Indianapolis & St. Louis	208	Valley (Virginia).....	826
Indianapolis & Vincennes.....	652	Vicksburg & Meridian.....	622
International & Gt. No.....	367	Vicksburg, Shreveport & P....	423
Iron	493	Virginia Midland.....	139
Jeff., Madison & Indianapolis.	652	Western Maryland 139,	861
Kans. City, Ft. Scott & Gulf..	456	Western North Carolina	192
Kans. City, Springfield & Mem	485	Western Union Telegraph Co..	714
Kansas City Union Depot Co...	256	West Jersey	622
Kentucky Central.....	770	Wheeling & Lake Erie.....	698
Lake Shore & Mich. So.	23, 328, 344	Wilmington, Col. & Augusta..	104
Lawrence	651	Wilmington & Northern.....	652
Lehigh Coal & Navigation Co..	140	Wilmington & Weldon.....	104
Lehigh Valley.....	68, 224	Wisconsin Central.....	553
Leh. & Wilkes-Barre Coal Co ..	139	Worcester, Nashua & Roch....	196
Little Miami.....	394	Wrightsville & Tennille	251
Little Rock & Ft Smith.....	698		

Richmond, Fredericksburg & Potomac.

This company owns a line from Richmond, Va., to Quantico, 83 miles. The following statements are from the report presented at the recent annual meeting in Richmond.

The earnings for the year were as follows:

	1885-86	1884-85.	Inc. or Dec.	P.c.
Transportation	$490,379	$469 412	I. $29,967	6.4
Rents, etc	6,033	2,501	I. 3,532	141.3
Total	$505,412	$471.913	I. $33.499	7.1
Expenses	271,536	280,097	D. 8.561	3 1
Net earnings	$233,876	$191,816	I. $42,060	21.9
Gr. ss earn. per mile	6,089	5.686	I. 403	7.1
Net earn. per mile	2,818	2.311	I. 507	21.9
Per cent. of exps	53.7	59.4	D. 5.7	....

The increase in earnings was large and was accompanied by a decrease in expenses.

The result of the year was as follows:

Net earnings as above		$233,878
Interest on bonds	$50 369	
Dividends on guaranteed stock	34,835	
		85,204
Balance, net income for the year		$148,672

This balance is equivalent to about 6½ per cent. on the common stock and dividend scrip. The President's report says:

"The year just closed has been the most prosperous in the annals of your company, and in the opinion of the board a substantial dividend is now in order. It is believed by the board that a dividend of 6 per cent. can be safely paid without endangering the ability of the company to contend with the rival line which has just been established between Richmond and the North by the roundabout way of the James River, Cape Charles and the New York, Philadelphia & Norfolk Railroad."

Petersburg.

This company owns a line from Petersburg, Va., to Weldon, N. C., 59 miles. The report is for the year ending Sept. 30.

The company has $323,500 preferred stock, $1,000,700 common stock and $1,744,000 funded debt.

The earnings for the year were:

	1885-86.	1884-85.	Increase.	P. c.
Earnings	$359,596	$345,725	$13.871	4.0
Expenses	198,663	188,033	10,630	5.7
Net earnings	$160,933	$157,692	$3,241	2.1
Gross earn. per mile	6,095	5,860	235	4.0
Net " "	2,728	2,673	55	2.1
Per cent. of expenses	55.2	54 4	0.8	...

Interest and dividends on guaranteed stock last year amounted in all to $115,720, leaving a surplus of $45,213, equivalent to 4½ per cent. on the common stock for the year.

The report says: "Under these circumstances the board thinks a dividend of 3 per cent. on the stock is justified. The total founded debt is $1,744,000 ($301,000 old first-mortgage 8s $643,000 class A 5s and $800,000 class B 6s), not including $56,000 in class A bonds in the treasury and $301,000 in the hands of the trustrees to redeem the old 8 per cent. bonds as they mature and are presented. The issue of class A bonds was increased during the year $83,000. This was in consequence of an exchange made by the company of 83 class A for 83 class B bonds, thus reducing the annual fixed charges. During the year $25,000 of the old first-mortgage 8s were paid off."

Cheshire.

This company owns a line from Bellows Falls, Vt., to South Ashburnham, Mass., 53½ miles. It has leased the use of the Fitchburg Railroad from South Ashburnham to Fitchburg, 10½ miles; it also leases the Monadnock road, from Peterboro, N. H., to Winchendon, Mass., 16 miles, making a total of 80 miles worked. The report is for the year ending Sept. 30.

The company has $53,300 old stock and $2,100,000 new or preferred stock. The funded debt consists of $800,000 plain 6s.

The earnings for the y ear were as follows:

	1885-86.	1884-85.	Increase	P.c.
Earnings	$628.070	$561.204	$66,866	11.9
Expenses	393,633	347,347	46,286	13.3
Net earnings	$234,437	$218,857	$20,580	9.6
Gross earn. per mile.	7,851	7,015	836	11.9
Net earn. per mile..	2,930	2,673	257	9.6
Per cent. of exps...	62.7	61.9	0.8	....

The earnings show a considerable gain over the previous year. Expenses include taxes.

The result of the year was as follows:

Net earnings as above		$234,437
Interest	$48 000	
Rentals	51 727	
Dividends	105,000	
		204,727
Balance, surplus		$29,710

The dividends were 5 per cent. on the preferred stock, an increase of 2 per cent. over the previous year.

The road carried 173,212 passengers, an increase of 2.4 per cent., and 611,898 tons of freight, an increase of 22.1 per cent. over the previous year.

Hartford & Connecticut Western.

This company owns a line from Hartford, Conn., to the Hudson River at Rhinecliff, N. Y., 108¾ miles, with a branch from State Line to Millerton, N. Y., 1⅙ miles, making 110 miles in all. The report is for the year ending Sept. 30.

The company has (including old bonds convertible into stock) $2,720,000 capital stock. The funded debt is $600,000 in first-mortgage 5s, of which $510,000 have been issued and $90,000 are in the treasury.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc or Dec.	P. c.
Earnings	$348,965	$311,962	I. $37,903	12.2
Expenses	247,669	300,699	D. 53,030	17 6
Net earnings	$101,296	$10,263	I. $90,933	877 5
Gross earn. per mile	3,172	2,828	I. 344	12.2
Net " " "	921	94	I. 827	877.5
Per cent. of exps	71.0	96.7	D. 25.7	.....

The great increase in net earnings was largely due to a decrease in expenses, secured by strict economy. The decrease was also due in part to the good condition of the road as compared with former years.

The result of the year was as follows:

Net earnings, as above		$101,296
Old debts collected, etc		997
Total		$102,293
Taxes, etc	$12,990	
Interest paid	33,280	
		46,270
Balance, surplus for the year		$56,033

The surplus was equivalent to over 2 per cent on the stock.

During the year the entire floating debt was paid off The condition of road and equipment was improved by full renewals.

New Haven & Derby.

This company owns a line from New Haven, Conn., to Ansonia, 13 miles. The statement is for the year ending Sept. 30.

The company has $446,600 capital stock. The funded debt includes $300,000 first mortgage 7s and $225,000 second mortgage 7s indorsed by the city of New Haven.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc or Dec.	P.c.
Earnings	$162.679	$150,738	I. $11,941	7.9
Expenses	88,179	92,697	D. 4,518	4.9
Net earnings	$74,500	$58,041	I. $16,459	28.4
Gross earn. per mile..	12.514	11,595	I. 919	7.9
Net " " ..	5,731	4.465	I. 1,266	28.4
Per cent. of exps.....	54.1	61 5	D. 7.4	....

The net earnings were sufficient to pay interest on the bonds and leave a balance of $37,750.

Knox & Lincoln.

This company owns a line from Bath, Me., to Rockland, 49 miles. The statement is for the year ending Sept. 30.

The company has no bonded debt. It is owned by the towns along the line, which have issued $2,395,000 bonds to pay for it.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Earnings	$146,439	$138,739	I. $7,700	5.5
Expenses	104,426	108,033	D. 3,607	3,3
Net earnings	$42,013	$30,706	I. $11,307	36 8
Gross earn. per mile...	2,989	2,831	I. 158	5.5
Net " " ...	857	627	I. 230	36.8
Per cent. of exps... ..	71.3	77 9	D. 6.6	...

The net earnings are applied to the payment of the interest on the town bonds, the deficiency being made up by the towns.

An extension through the city of Rockland to the water front is to be built, probably next season.

Georgia Pacific.

This company owns three lines, not at present connected, as follows: First Division, Atlanta, Ga., to Coalburg, Ala., 177 miles, with 9.24 miles of branches; Second Division, Cane Creek, Ala., to Columbus, Miss., 75.4 miles, with leased line from Columbus to Starkville, 25 miles, and 3.66 miles of branches; Third Division (3 ft. gauge), Greenville, Miss., to Johnsonville, 29.5 miles, with branch from Stoneville to Sharkey, 22.5 miles. The total is 342.3 miles. The statement is for the year ending Sept. 30.

The line from Columbus to Artesia, 25 miles, was added Dec. 1, 1885, being leased from the Mobile & Ohio Co.

The earnings were reported at the recent annual meeting as follows:

	1885-86.	1884-85.	Increase.	P. c.
Earnings	$784,812	$666,662	$118.150	17.7
Expenses	563,769	463,980	99,789	21.3
Net earnings	$221,043	$202,682	$18,361	9.0
Gross earn. per mile	2,322	2,121	201	9.5
Net " " "	654	645	9	1.2
Per cent. of exps	74.7	69.6	5.1	....

The taxes last year were $23,370, leaving a net balance of $197,673 for the year.

During the year the First Division was changed from 5 ft. to standard gauge. The Second Division had been changed in the previous year.

New York, New Haven & Hartford.

This company, during the fiscal year ending Sept. 30 last, owned or leased and worked the following lines:

	Miles.
Williamsbridge, N. Y, to Springfield, Mass	123.20
Middletown Branch	10.00
New Britain Branch	3.00
Suffield Branch	4.50
Total owned	140.70
Harlem River & Portchester, leased	11.80
Stamford & New Canaan, leased	8.30
Shore Line, leased	50.97
Boston & New York Air Line, leased	50.00
Colchester Branch, leased	3.59
	124.66
Total worked	265.36

There are on the line owned 123.2 miles of second track and 89.115 miles of sidings; on the lines leased, 11.8 miles of second track and 30.129 miles of sidings.

The equipment includes 132 locomotives; 307 passenger and 95 mail and baggage cars; 2,920 freight cars.

The balance sheet is as follows, condensed:

Capital stock		$15,530,000
Bonds		2,000 000
Accounts and balances		641,688
Contingent account		236,989
Profit and loss		3,026,426
Total		$21,405,103
Road and property	$16,764,757	
Sinking fund	1,184,258	
Materials and supplies	366,170	
Accounts receivable, stocks, etc	1,464,028	
Cash	1,625,910	
		21,405,103

The bonds are 4 per cent. bonds, issued in 1883 The company is also responsible as indorser on $3,000,000 Harlem River & Portchester bonds, the yearly charge on which is $170,000.

In addition to the mileage noted above, the company's trains use the New York & Harlem track from Williamsbridge to the Grand Central Depot in New York City, a distance of 11 miles.

The earnings and expenses for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Passengers	$4,225,698	$3,945,141	I. $280,557	7.1
Freight	2,795,241	2,423,594	I. 371,647	15.3
Mail, express, etc	451,351	416,803	I. 34,548	8.3
Rents, etc	129,656	110,287	I. 19,369	17.6
Total	$7 601,946	$6,895,825	I. $706.121	10.2
Expenses	4,967,976	4,623,987	I. 343 989	7.4
Net earnings	$2,633,970	$2,271,838	I. $362,122	15.9
Gross earn. per mile	28,648	25,987	I. 2.661	10.2
Net " "	9,926	8,560	I. 1,366	15.9
Per cent. of exps	65.4	67.0	D. 1.6	....

Expenses last year include $192,147 for rents of depots and grounds, and $306,946 for taxes.

The earnings over the Harlem Railroad track, which are paid as rental for the use of that track, are not included in the earnings or expenses above. They amounted to $325,863 last year.

The result of the year was as follows:

Net earnings, as above		$2,633,970
Rentals of leased roads	$250,730	
Interest on bonds	80,000	
" Harlem River & Portchester bonds	170,000	
Dividends, 10 per cent	1,550,000	
		2,050,730
Balance, surplus for the year		$583,240
Increase in accounts payable		31,424
Sale of real estate		9,982
Surplus, Oct. 1, 1885		2,563,803
Total		$3,188,449
New construction, third and fourth tracks	$95,391	
Increase in materials	3,120	
		98,511
Surplus, Sept. 30, 1886		$3,089,938

This surplus is made up as follows: Advances to Harlem River & Portchester, $17,010; stock of Harlem River & Portchester, $42,160; stock of New York Transfer Co., $1,600; securities of Hartford & Connecticut Valley Co., $972,050; bills and accounts receivable, $431,208; cash, $1,625,910; total, $3,089,938, an increase of $526,135 during the year.

The traffic for the year was as follows:

	1885 86.	1884-85.	Increase.	P. c.
Pass. train-miles	2,576 385	2,526,616	49,769	1.9
Freight " "	1,388,161	1,314,437	73,724	5.6
Total loco.-miles	4,973,243	4.803.352	169,891	3.5
Passengers carried	8,267,310	7,765.575	501,735	6.5
Passenger-miles	226,162,614	208:676,877	17,485,767	8.4
Tons freight carried	2,376.195	2,148.463	227,732	10.6
Ton-miles	159,175,052	124,168.149	15,006 903	12.1
Av. train load:				
Passengers, No.	87.8	82.6	5.2	6.3
Freight, tons	100.3	94.5	5.8	6.1

Expenses have not increased in proportion to the traffic, partly on account of the deceased cost of fuel, and partly from diminished cost of maintenance due to stone ballast and other improvements.

During the year the stone ballasting was extended, several bridges renewed, much work done on stations and other improvements made, all of which have been paid for from earnings.

Plans are under consideration for the substitution of a bridge for the difficult and dangerous Asylum street crossing in Hartford. There has been much delay on account of differences of opinion as to the best plan, but there is a prospect that one will be adopted shortly.

The report says: "The average fare per mile for *all* travelers has been 1.92 cents per mile this year, as against 1.94 cents last year, while the actual cost of carrying each per mile, on the same basis assumed last year, as to elements of cost, has been only 1.33 cents, as against 1.58 cents last year. This fact demonstrates what no thinking person would ever question, viz., that up to the point where increase in volume of traffic increases the cost of doing it, with equal or greater rapidity, the more business a railroad does the cheaper it can do it.

"This is doubtless just as true of freight business as of passenger, other conditions being the same. In view of this fact, we are led to the belief that this road can safely venture on a reduction of fares to 2 cents a mile on its Main Line, and 2½ cents on both its Shore Line and Air Line divisions.

"Accordingly, by vote of the board, fares will be reduced to these rates on and after Jan. 1, 1887. This reduction is to be made in the earnest hope that it will not hereafter become necessary to go back to old rates, either because the business has become so dwarfed in volume, or so expensive in its legalized methods, as to compel such return.

"There is still, and probably will always be, much new work to be done to keep the road abreast of the times, but by the proposed reduction (on the assumption that we carry as many passengers as many miles the coming year as we did last) the shrinkage in passenger receipts would be about $500,000. With the handsome gain on hand from earnings of last year the road can, if it must, stand up under this shrinkage for a time. Besides, it is fair to expect some increase in *number* of passengers resulting from this decrease in rates of fare. At all events, our company is now in good condition to test the question whether decrease of fare will always increase net passenger earnings. * * *

"The matter of improving the grades and curves of the Air Line Division, between Middletown and Willimantic, has received the attention of the board during the past year, and it is found that, while the Air Line is in very good condition for traffic, yet it will cost, to double its track and make it otherwise as good as the best portions of our system now are, not less than $1,500,000. This is a sum quite beyond the present ability of the Air Line to devote to this object.

"The Air Line has never, until this year, earned enough to keep itself in repair and pay its rental. This year, however, it has paid its operating expenses, including rent and taxes, and shows about $15,000 net earnings. If this is to be accepted as an evidence of better days for the Air Line, it may reasonably be expected to undertake this track improvement in the near future. It is not easy to see how this improvement can, in justice, be undertaken, however, at the expense of other divisions, with the result of postponing, if not preventing, the reduction of passenger rates we have decided it our duty to make for the benefit of the patrons of the entire road.

"We are clear that, situated as our property is, the *many* travelers are entitled to those reduced rates, much more than the comparatively few through travelers, by either or all the lines, are to have the earnings of the Main Line and Shore Line diverted to the improvement of the Air Line, with the consequence that all passenger rates remain in *statu quo* for another year. * * * *

"In accordance with the wish of many stockholders, the board has decided to distribute the net earnings of the road quarterly, commencing with April 1 next. It is hoped that the company will be able to pay 2½ per cent. quarterly, instead of 5 semi-annually, as heretofore. More ought not, in the judgment of the board, to be expected. But if the time shall ever come when the company shall have the ability, in justice to its entire property, to pay larger dividends to stockholders, that fact would, in our opinion, be best shown in a still further reduction of the cost of transportation to the public.

"We have now near completion a reasonably convenient connection at Harlem River, by easy transfer, with the Suburban Rapid Transit Railroad at that point, which we hope will be found a convenience to our patrons on the Harlem River Branch."

New York & New England.

This company operates a line from Boston to Fishkill-on-Hudson, N. Y., 228.56 miles (including 11.02 miles leased from the Newburg, Dutchess & Connecticut); 108.93 miles of branches owned and 54.08 leased; a total of 391.57 miles. The report is for the year ending Sept. 30.

The company also leases the Norwich & Worcester road, 66.40 miles, but the operations of that line are not included in the report.

At the beginning of the year the road was in possession of a receiver, but the receivership was terminated Dec. 31, 1885, when the company resumed possession.

The general account, condensed, is as follows:

Common stock		$20,000,000
Preferred stock		1,900,000
Funded debt		14,361,000
Terminal property and real estate mortgages		1,692,496
Current accounts and balances		570,910
Total		38,524,406
Road and property	$36,882,293	
Cash and current assets	971,911	
Profit and loss, deficit	670,202	
		$38,524,406

Common stock includes $19,313,000 stock issued and $687,000 Berdell bonds convertible into stock. The funded debt includes $6,000,000 first mortgage 7s; $4,000,000 first mortgage 6s; $3,363,000 second mortgage 6s and $998,000 second mortgage 3s.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Freight	$2,262,479	$1,850,266	I. $412,213	22.2
Passengers	1,296,886	1,139,916	I. 156,980	13.7
Mail and express	139,821	144,389	D. 4,568	3.2
Miscellaneous	200,210	154,375	I. 45,835	29.8
Total	$3,899,406	$3,288,946	I. $610,460	18.6
Expenses	2,483,966	2,207,579	I. 276,387	12.5
Net earnings	$1,415,440	$1,081,367	I. $334,073	30.9
Gross earn. per mile	10,175	8,638	I. 1,537	18.6
Net " " "	3,637	2,848	I. 789	30.9
Per cent. of exps.	64.3	68.9	D. 4.6	...

Miscellaneous receipts include $993 profit on the Norwich & Worcester lease, which has usually been a source of loss heretofore.

The result of the year was as follows:

Net earnings, as above		$1,415,440
Taxes and insurance	$137,938	
Rent of leased lines	60,235	
Interest, Boston terminals, etc.	77,868	
" bonded debt	804,959	
" old floating debt	94,269	
Dividend, 7 per cent., on preferred stock	133,000	
		1,404,280
Balance, surplus for the year		$11,160

Expenditures for new construction and equipment, charged to property accounts, were $174,253, the chief items being $87,166 for new second tracks and $25,796 for improvements on the South Boston terminal property.

The traffic for the year was as follows:

	1885-86.	1884-85.	Increase.	P. c.
Revenue train miles	2,259,030	2,106,764	152,266	7.2
Total loco. miles	2,996,804	2,735,028	261,780	9.6
Passengers carried	5,240,906	4,616,014	624,892	13.5
Passenger miles	63,870,470	58,015,468	5,855,002	10.1
Tons freight carried	2,089,339	1,705,661	383,678	22.5
Ton-miles	135,470,333	107,639,953	27,830,380	25.9

The average passenger journey last year was 12.2 miles; the average freight haul was 64.5 miles.

The earnings per unit of traffic were as follows in cents:

	—Per pass. mile.—		—Per ton-mile.—	
	1885-86.	1884-85.	1885-86.	1884-85.
Through	2.270	2.120	0.990	0.952
Local	2.100	2.080	2.983	3.151
Average of all	2.020	1.950	1.673	1.707
Cost	1.470	1.510	1.138	1.244
Net earnings	0.550	0.440	0.535	0.465

The local rate above does not include season ticket passengers. The earnings per revenue train mile last year were $1.71 gross and $0.61 net.

The report of President Charles P. Clark states that the property was delivered into the possession and control of the company with the close of business on Dec. 31, 1885.

"Owing to this fact, the accounts furnished by the Auditor, and printed herewith, embrace three months of the fiscal year, during which the property was in the custody of the Court, and nine months during which it has been managed by the company. They register the settlement of the old debts and of the car trusts, as well as that of many claims upon and expenses of the property growing out of contracts and accidents prior to the current year. The net earnings have been thus reduced by about $93,000, and the net results by the further sum of $113,141. The latter sum includes $94,269 for interest upon the floating debt existing at the time of your annual meeting in 1883, the existence of which made the receivership a necessity. If divested of all matters not pertaining to the operations of the year, the accounts would show that the property has earned all its charges, the full dividend on its preferred stock and 1 per cent. upon its common shares.

"The property of the company, including its equipment, has been kept in thorough repair, but no additions to the equipment have been made other than that of car trust. The company has an excess of motive power, more than 20 locomotives in good order being still stored at Norwood and Boston.

"The property at the foot of Summer street, Boston, known as Richardson's Wharf, has now been leased for the term of 51 years from May 1, 1886, at an annual rental of $15,000 and taxes. There is also a privilege of purchase after two years by the payment of $300,000.

"A proposition has been made by the company to the City Council of Providence to refer to the three senior Justices of the Supreme Court of Rhode Island, as arbitrators, the questions in dispute as to the terminal facilities granted for this road in 1852.

"The Norwich & Worcester Railroad has been operated successfully under the lease as amended, but with a profit of only $993. The repairs for damages caused by the freshet in February cost $40,400, which was charged to expenses. The main line of that road is now all of steel.

"The Treasurer of the state of Connecticut, as Trustee of the mortgage upon the Connecticut Central Railroad, has progressed with his application for foreclosure, and a decree has been passed. Certain of the stockholders have taken an appeal, and an absolute foreclosure has not yet been secured. The mortgage secures the payment of $325,000 par value of bonds, all of which are owned by this company, having been purchased in 1880. This road is 20.2 miles in length, from East Hartford to the state line of Massachusetts, with a branch of 7.3 miles in lengths, from Melrose to Rockville. * * * The board recommends the acquisition of the Springfield & New London, 7.25 miles, and the property formerly owned by the Springfield, Athol & Northeastern in the city of Springfield."

Richmond & Petersburg.

This company owns a line from Richmond, Va., to Petersburg, 22.5 miles, with a branch to Port Walthall, 2.5 miles, making 25 miles in all. The report presented at the 52d annual meeting is for the year ending Sept. 30.

The earnings for the year were as follows:

	1885-86.	1884-85.	Increase.	P. c.
Earnings	$207,454	$192,651	$14,803	7.7
Expenses	111,856	97,482	14,374	14.7
Net earnings	$95,598	$95,169	$429	0.5
Gross earn. per mile	8,298	7,706	592	7.7
Net " "	3,824	3,807	17	0.5
Per cent. of expenses	53.9	50.6	3.3	....

Interest on funded debt amounted to $22,062, and dividends (5 per cent.) to $50,000, leaving a balance of $23,536, to which is to be added $1,232 miscellaneous receipts, making a total surplus of $24,768. The income statement is as follows:

Surplus, as above		$24,768
Receipts from $79,000 consols 6s sold		91,649
Total		$116,417
Old 8 per cent. bonds redeemed	$24,000	
Completion of James River bridge	7,613	
Terminal improvements in Richmond	96,052	
		127,665
Excess of payments		$11,248

The report says: "All the old first mortgage 8 per cent. bonds have been paid off except $1,000 past due, which have not been presented. There are $30,000 of the consol 6s in the treasury unused.

"The James River bridge, with its approaches, is now complete, and is in all respects satisfactory. In masonry and iron work it is fully up to the highest standard of railroad bridges in this country.

"The earnings of the past year seem to justify the directors in increasing the semi-annual dividend to 3 per cent., which has been declared payable, as usual, in January."

Northeastern (South Carolina).

This company owns a line from Charleston, S. C., to Florence, 102 miles. The report is for the year ending Sept. 30.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Earnings	$568,633	$570,058	D. $1,425	2.0
Expenses	436,868	407,238	I. 29,630	7.3
Net earnings	$131,765	$162,820	D. $41,055	25.2
Gross earn. per mile	5,477	5,589	D. 112	2.2
Net " "	1,194	1,596	D. 402	25.2
Per cent. of exps.	78.2	71.4	I. 6.8	....

President Ravenel's report says: "During the past year we have moved 123,307 bales cotton and 66,023 barrels of naval stores, as against 134,549 bales of the first and 85,655 barrels of the latter the previous year. The reduced movemenes in these staple articles was, of course, followed by corresponding reductions in our miscellaneous freights to the interior, whence they were derived.

"Among our expenses of this year will be found the aggregate cost of two first-class Baldwin engines, amounting to $15,050, and also the expenditures incidental to a change in the gauge of the road and its equipment, from 5 ft. to 4 ft. 9 in., to conform to that of the roads on either side of us, and by which the costly transfers of freights and passengers at Wilmington, N. C., will in future be avoided.

"Included in these expenses, under the heads of personal injury and wrecking, is an amount of $20,300, of which $8,266 is properly chargeable to the transactions of 1883."

Richmond & Danville.

This company owns the Richmond & Danville (including the Piedmont road) from Richmond, Va., to Greensboro, N. C., 189 miles, with 12.2 miles of branches, and the Northwestern North Carolina road, 25.2 miles. It leases the Richmond, York River & Chesapeake, Richmond to West Point, 38 miles; the North Carolina road, Goldsboro, N. C., to Charlotte, 223.1; the Atlanta & Charlotte Air Line, Coarlotte, N. C., to Atlanta, Ga., 269; making 756.5 miles worked in all. The report is for the year ending Sept. 30.

The company controls and works the Milton & Sutherlin, 6.8, and the State University road, 9.2 miles, which are reported separately. Through the Atlanta & Charlotte lease, it controls 70 miles of narrow-gauge branches in Georgia. Through the Richmond & West Point Terminal Co., it controlled the Charlotte, Columbia & Augusta, the Columbia & Greenville, the Georgia Pacific, the Western North Carolina and the Virginia Midland roads, 1,580 miles of road in all, but those roads are now leased, as noted below:

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Freight	$2,646,434	$2,660,755	D. $14,321	0.5
Passengers	998,022	985,709	I. 12,313	1.2
Mail and express	232,952	238,471	D. 5,519	2.3
Rents, etc	115,073	96,420	I. 18,653	19.2
Total	$3,992,481	$3,981,355	I. $11,126	0.3
Expenses	2,121,553	2,231,486	D. 109,933	4.6
Net earnings	$1,870,928	1,749,869	I. $121,059	6.9
Gross earn. per mile	5,277	5,263	I. 14	0.3
Net " " "	2,473	2,313	I. 160	6.9
Per cent. of exps.	53.1	56.1	D. 3.0	....

The increase in net earnings was due entirely to the reduction in expenses.

Expenses include taxes and all renewals of road and equipment.

The expenses were divided as follows:

	—1885-86.—		—1884-85.—	
	Amount.	P. c.	Amount.	P. c.
Conducting transportation	$721,894	18.1	$694,487	17.4
Motive power	581,240	14.6	616,553	15.5
Maintenance of cars	166,978	4.2	214,632	5.4
Maintenance of way	457,910	11.4	486,128	12.2
General expenses	193,531	4.8	219,686	5.6
Total	$2,121,553	58.1	$2,231,486	56.1

The reduction was made in maintenance of way and cars, and in motive power

The result of the year was as follows:

Net earnings		$1,870,928
Interest, etc		19,547
Total		$1,890,475
Rentals of leased lines	$877,850	
Interest	589,808	
Cost of betterments and charge of gauge	323,958	
		1,791,646
Balance, surplus for the year		$98,859

Interest on the debenture bonds (238,140) is included above but was not paid.

In his report President Buford says: "This company in April last negotiated leases of such of said lines as had not previously been under the direct control of this company, taking effect as follows, namely: Virginia Midland Railway, April 15, 1886; Western North Carolina Railroad, Charlotte, Columbia & Augusta Railroad and the Columbia & Greenville Railroad, May 1, 1886.

"In accordance with the administrative policy declared in the annual report of the President and directors submitted and approved at the last annual meeting the surplus incomes of the company had been applied, as far as deemed necessary, to such improvements and additions to the company's properties as appeared to be essential to the permanent strength of the system and the protection of its revenues in the interest of all who held its securities. Thus no adequate means, properly so applicable, have been available upon which to declare a dividend to debenture-holders for the year. But, looking to the improved condition of the company's properties and interest, physically and financially, the board in considering best how to provide for the situation, present and prospective, in August last proposed a scheme of adjustment of the company's obligations under its debenture mortgage, based on the creation of a new general mortgage, embracing all the company's increased and accumulated property and interests, and providing for the issue of a 5 per cent. gold bond, to be accepted in exchange for the principal and accumulated interest of the debenture bonds, and also for the gradual absorption of all other obligations of the company, and the accommodation of other possible needs of the company, under limitations deemed conservative and necessary. Under this proposal a large amount of the debenture bonds have been filed for exchange as proposed."

Appended to the President's report is the report of a special committee to whom was intrusted the duty of preparing a condensed report on the financial condition of the company in December, 1886, as compared with August, 1883, when the present management assumed control. This report gives the present condition of the finances as follows:

Assets:	
Miscellaneous assets	$72,295
Advances to leased lines	526,755
Due from railroads, P. O. department, etc	230,645
Bills receivable	175,000
Cash in transit and due by agents	289,059
Cash in banks and loaned on call	763,996
Other available cash and cash assets	2,317,537
Total	$4,474,788
Liabilities:	
Due other railroads, accounts and pay-rolls	$528,119
Miscellaneous liabilities	31,876
Bills payable	4,136
Total	$564,131
Net surplus	$3,910,656

In August, 1883, the floating liabilities exceeded the available assets by $1,031,589. The committee's report says:

"There is due this company, under contract of lease, by the Atlanta & Charlotte Air Line, securities to the amount of $1,000,000, upon which 2.84 per cent. net was earned during the fiscal year ending Sept. 30, 1886, and which is constantly improving.

"During this period (August, 1883, to December, 1886) there have been added to the equipment of this company 427 freight cars, 11 express, postal and passenger cars, and 30 engines—16 of the largest type. There have been laid 19,953 tons of steel rails, 41,812 ft. additional sidings built, change of gauge, and a general improvement in road-bed, station houses, depots, etc., effected."